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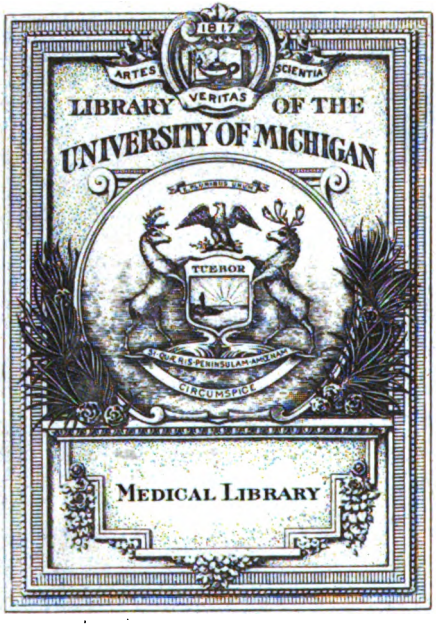

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With the compliments of the Medical Association of the State of Alabama, requesting an exchange of your latest published Transactions.

Address the Secretary,

Dr. Benj. H. Riggs,

Selma, Alabama.

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TRANSACTIONS

OF THE

MEDICAL ASSOCIATION

OF THE

STATE OF ALABAMA,

27th Session, 1874.

SELMA, APRIL 13TH, 14TH AND 15TH.

MONTGOMERY, ALA.:
BARRETT & BROWN, STEAM PRINTERS AND BOOK-BINDERS.
1874.

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PREFACE.

It is with no little pleasure, mingled with pride, that the Publishing Committee hand to the Members of the Medical Association of the State of Alabama its printed Transactions for the year 1874.

Believing that the work could be creditably performed in the Capital of the State, they cheerfully committed its execution to the care of Messrs. Barrett & Brown, one of the largest and most competent publishing houses in Alabama. The manner in which they have performed their part we hope will meet with your approbation.

Your Committee deemed it necessary to leave out a list of members of the County Societies, represented at your last meeting, in consequence of the fact that so large a space might be occupied more profitably by other matter. It would have added very much to the value and appearance of the volume to have procured all the Maps, Lithographs and Wood-cuts of the various papers and reports, but going to press on the tenth of July, no time was afforded for the proper execution of this portion of the book.

Your Committee regret that Dr. Osborn's Paper on Lupus, was not forwarded for publication.

With the earnest hope that the volume will fully realize your expectations,

We are, very respectfully,

Your obedient servants,

B. H. Riggs,
J. B. Gaston,
R. F. Michel,
Publishing Committee.

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OFFICERS, 1874.

27th SESSION.

PRESIDENT.

JOB SOBIESKI WEATHERLY.....Montgomery.

VICE-PRESIDENTS.

JOHN J. DEMENT.....Huntsville.
ROBERT DICKENS WEBB.....Livingston.

SECRETARY.

BENJAMIN HOGAN RIGGS.....Selma.

TREASURER.

WALTER CLARK JACKSON.....Montgomery.

BOARD OF CENSORS.

JEROME COCHRAN, Senior Censor.....Mobile.
JAS. GUILD.....Tuscaloosa.
RICHARD FRASER MICHEL.....Montgomery.
GEO. EARNEST KUMPE.....Leighton.
NICHOLAS DAVIS RICHARDSON.....Athens.

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HOUSE OF COUNSELLORS,

APRIL, 1874.

---

1. William H. Anderson..... Mobile.
2. William D. Bizzell..... "
3. Peter Bryce..... Tuscaloosa.
4. J. P. Burke..... Meridionville.
5. J. S. Bankson..... Stevenson.
6. Jerome Cochran..... Mobile.
7. William C. Cross..... Cherokee
8. Calvin A. Crow..... Moulton.
9. William Desprez..... Tuscumbia.
10. Louis W. Desprez..... Russellville.
11. John J. Dement..... Huntsville.
12. Edmond H. Fournier..... Mobile.
13. Rhett Goode..... "
14. Edmund Pendleton Gaines..... "
15. John Taylor Gilmore..... "
16. James Guild..... Tuscaloosa.
17. J. M. Godfray..... Sumterville.
18. S. H. Hill..... Carrollton.
19. William Hester..... Tuscaloosa.
20. Walter C. Jackson..... Montgomery.
21. William A. Johnson..... Uniontown.
22. Robert D. Jackson..... Selma.
23. Mortimer H. Jordan..... Birmingham.
24. John David Johnston..... Sumterville.

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25. GEORGE ERNEST KUMPE.....Leighton.
26. GEORGE A. KETCHUM.....Mobile.
27. JAMES KYLE.....Florence.
28. JOHN LITTLE, JR.....Tuscaloosa.
29. NICHOLAS P. MARLOW.....Tuscaloosa.
30. ADAM ALEXANDER MCKITTRICK.....Evergreen.
31. J. B. MCMILLAN..... "
32. E. D. MCDANIEL.....Camden.
33. R. F. MICHEL.....Montgomery.
34. GORONWY OWEN.....Mobile.
35. FRANCIS M. PETERSON.....Greensboro.
36. BENJAMIN H. RIGGS.....Selma.
37. F. A. ROSS.....Mobile.
38. AUGUSTUS J. REESE.....Mobile.
39. EDWARD A. SEMPLE.....Montgomery.
40. SAMUEL P. SMITH.....Prattville.
41. LOUIS H. SADLER.....Leighton.
42. THOMAS O. SUMMERS, JR.....Greensboro.
43. CALEB TOXEY.....Mobile.
44. JOB S. WEATHERLY.....Montgomery.
45. ROBERT D. WEBB.....Livingston.

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LIST OF DELEGATES

TO THE

AMERICAN MEDICAL ASSOCIATION.

W. O. Baldwin, M. D.
T. C. Osborn, M. D.
R. F. Michel, M. D.
G. A. Ketchum, M. D.
N. D. Richardson, M. D.
R. D. Webb, M. D.
E. D. McDaniel, M. D.
J. T. Gilmore, M. D.
C. H. Franklin, M. D.
T. O. Summers, M. D.
W. H. Anderson, M. D.
Jerome Cochran, M. D.

LIST OF CORRESPONDENTS.

Gratz A. Moses, St. Louis, Mo.
John S. Lynch, Baltimore, Md.

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REPORTERS FOR 1875.

Recent Progress in Practical Medicine—Dr. GEO. A. KETCHUM, Mobile.

Hygiene and State Medicine—Dr. JEROME COCHRAN, Mobile.

Inhibitory Nerves—Dr. R. FRASER MICHEL, Montgomery.

Great Malarial Epidemics—Dr. T. C. OSBORN, Greensboro.

Tuberculosis—Dr. E. P. GAINES, Mobile.

Cerebro-Spinal Fever—Dr. J. B. GASTON, Montgomery.

Food—Dr. ALLEN GREEN, Huntsville.

Medical Botany of Middle Alabama—Dr. S. P. SMITH, Prattville.

Recent Physiological Researches, and their Relations to Therapeutics—Dr. W. H. ANDERSON, Mobile.

Malaria—Dr. B. H. RIGGS, Selma.

Puerperal Convulsions—Dr. J. J. DEMENT, Huntsville.

Pathological Anatomy—Dr. T. O. SUMMERS, Greensboro.

Recent Progress in Gynæcology—Dr. F. M. PETERSON, Greensboro.

Pathological Relations of Pyæmia and Septicæmia to Erysepelas, Angeioleucitis, Hospital Gangrene, Secondary Hæmorrhage and Tetanus—Dr. J. T. GILMORE, Mobile.

Report on Surgery—Dr. C. J. CLARK, Selma.

Topography and Climatology of North Alabama—Dr. LOUIS H. SADLER, Leighton.

President J. S. WEATHERLY, M. D., requests the members of the Association to write upon subjects that will be of interest and value to the Association, and earnestly requests the organization of new Medical Societies throughout the State.

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MINUTES OF PROCEEDINGS

OF THE

MEDICAL ASSOCIATION

OF THE STATE OF ALABAMA.

TWENTY-SEVENTH ANNUAL SESSION,

Held in Selma, April 13th, 14th, and 15th, 1874.

FIRST DAY—Monday, April 13th.

The Association assembled in the Hall of the Young Men's Christian Association, on Broad Street. The following Counsellors and Delegates appeared and registered:

COUNSELLORS.

GEO. A. KETCHUM, FRANK ARMSTRONG ROSS, WILLIAM HENRY ANDERSON, JEROME COCHRAN, CALEB TOXEY, WILLIAM D. BIZZELL, of Mobile; THOS. O. SUMMERS, JR., of Greensboro; PETER BRYCE, of Tuscaloosa; ROBERT D. JACKSON, of Dallas County; ROBERT D. WEBB, of Livingston; F. M. PETERSON, of Greensboro; GEORGE E. KUMPE, of Leighton; CALVIN A. CROW, of Moulton; LOUIS W. DESPREZ, of Russellville; JNO. P. BURKE, of Meridionville; W. A. JOHNSTON, of Uniontown; LEWIS H. SADLER, of Leighton; MORTIMER H. JORDAN, of Birmingham; WILLIAM HESTER, of Tuscaloosa; EDWARD P. GAINES, of Mobile; JOHN J. DEMENT, of Huntsville; EDWARD DAVIES MCDANIEL, of Camden; J. S. BANKSON, of Jackson

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County; J. S. WEATHERLY, EDWARD A. SEMPLE, of Montgomery; BENJ. HOGAN RIGGS, of Selma; S. P. SMITH, of Prattville; RICHARD FRASER MICHEL, and WALTER CLARK JACKSON, of Montgomery—29 Counsellors.

DELEGATES.

Selma Medical Society (Dallas County)—Clifford D. Parke, M. D., Courtney James Clark, M. D., and Jno. P. Furniss, M. D.

Sumter County Medical Society—John H. Giles, M. D.

Bibb County Medical Society—L. E. Starr, M. D.

Canebrake Medical Society (Perry County)—W. A. Bradfield, M. D.

Limestone County Medical Society—Nicholas Davis Richardson, M. D.

North Alabama Medical Society—Byron O. Masterson, M. D.

Talladega Medical Society—C. W. Toole, M. D., and W. H. Harrison, M. D.

Madison County Medical Society—Louis D. Carter, M. D., and John D. Humphrey, M. D.

Southern University, Greensboro—Richard Inge, M. D.

Tuscaloosa Medical Society—A. S. Garnett, M. D.

Montgomery Medical and Surgical Society—J. B. Gaston, M. D., and A. S. Pearsall, M. D.

Chocktawhatchie Medical Society (Henry County)—Jas. Gillespie, M, D.

Bullock County Medical Society—C. H. Franklin, M. D., and Samuel H. Pou, M. D.

Jefferson County Medical Society—J. W. Sears, M. D.

Marengo County Medical Society—J. S. Ruffin, M. D.—15 Societies, and 19 Delegates. There were present, also, a large number of physicians who were not eligible to membership.

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There being found a constitutional quorum present on calling the roll, the Association was called to order, at fifteen minutes to one o'clock, by the President, George A. Ketchum, M. D., of Mobile.

There were also present Vice-President Edward A. Semple, M. D., of Montgomery; and Ex-Presidents Richard Fraser Michel, M. D., of Montgomery, Thos. C. Osborn, M. D., of Greensboro, and George Ernest Kumpe, M. D., of Leighton.

Of the Board of Censors, there were present Jerome Cochran, M. D., Senior Censor, R. F. Michel, M. D., and George E. Kumpe, M. D. These officers occupied chairs near the President.

Exercises were begun by prayer by the Rev. James B. Cottrell, D. D., of the Methodist Church.

James Kent, M. D., Chairman of the Committee of Arrangements of the Selma Medical Society, then delivered the following welcoming address in an earnest and engaging manner:

Mr. President, and Gentlemen of the
Medical Association of the State of Alabama:

Upon me, as Chairman of the Committee of Arrangements, devolves the pleasant duty of welcoming you to our city.

Six years have elapsed since the preliminary meeting was held in this city that inaugurated and adopted the plan of reorganization of the State Medical Association, and we must be excused if to-day, and in this large and intelligent presence, we indulge in a feeling of proud satisfaction at the brilliant success that has attended so important an enterprise originating in our city. Whether the Association is destined to be short or long lived, it has already given substantial evidences of both its ability and determination in working out the great and important problems of reform that so deeply affect the prosperity, honor and usefulness of the medical profession, and has made an impression upon it, the salutary influence of which will be long felt, and which can not be speedily or easily counteracted.

Increasing in dignity, influence and power with each year that is added to

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its age, the hope is created, that by steady perseverance and united effort the Association will ultimately succeed in the complete accomplishment of all the objects of its organization, and fulfill the high expectations of those whose zeal and devotion to the interest of medicine induced them to organize the Association.

Then will come a glorious era in the history of medicine. Then will she demand a higher manhood. Then will she rise in her might, and crush out the errors engrafted upon her by ignorance, superstition, mysticism and fraud. Then will Truth, with effulgent beams, dispel the fogs and vapors of Empiricism and false Philosophy. Then will the profession of medicine be no longer a trade, filled with blind routineism and empiricism—but a noble, exalted science, indeed and in truth, guided by principle, founded on facts elevated and pure, presenting a bond of union and strength for the protection of the rights, the elevation of the character, and the furtherance of the great interests of the medical profession throughout the State.

Your coming, gentlemen, has been anxiously looked for by us, and your brethren of Selma desire to manifest their appreciation of the cause in which you are engaged; and our people unite with us in our estimation of the honor conferred by the Association in selecting Selma as the place for holding the present session. Therefore, in the name of both People and Profession, we tender you a sincere, a hearty, and a cordial welcome; and trust that your visit to our city will be both pleasant and profitable to you, and that your labors will redound to the glory, usefulness and advancement of our noble Profession.

The annual address of the President being next in order, Dr. Ketchum proceeded to address the large and intelligent audience present—a number of citizens having now come in—for about an hour, upon questions of great importance to the citizens of Alabama, and mainly upon Hygiene. His address will be found in its proper place.

Dr. Weatherly moved that the President's address be referred to a committee of three, with instructions to report at the present session. Adopted.

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The annual report of the Secretary was then read, received and filed.

REPORT OF THE SECRETARY.

To the President of the Medical Association of the State of Alabama:

Your Secretary, some time in the summer of 1873, received from the former Secretary a small box containing the minutes of the session at Tuscaloosa, and a small amount of stationery, and some copies of the proceedings of former sessions of the Association, and transactions of other State organizations, received in exchange. Whenever our finances will permit, it will be well to purchase a suitable book-case, or repository of some kind, in which to keep the property belonging to the office of Secretary.

In the minutes of the meeting at Tuscaloosa, I am of the impression that an error was made in the time for holding this session; it was, however, reported as the second Monday in April, and was so ordered. It will be probably well to call our next meeting on Tuesday, as such has been our custom in the past, and is the usual custom of Conventions.

It is the duty of the Secretary to have charge of the seal of the Association; one has not been purchased, for reasons that will suggest themselves to you at once, but I recommend that it would be well to do so as soon as we can.

As Chairman of the Publishing Committee, I would state that great delay in issuing the volume of transactions was caused by accidental circumstances, which will not be longer operative. I trust that our next volume will not only be more promptly issued, but will be more creditable to this body in its material, and to the publisher in its typographical and mechanical details.

As required by Art. 39, Sec. 10, I herewith submit a full roll of Counsellors for 1873.

I had two hundred copies of last year's proceedings printed, and sent two to each Counsellor, and one to all the Secretaries of other State Associations as far as I knew, and to such Journals and other organizations as I thought were likely to reciprocate or feel an interest in our doings.

I issued 350 printed copies of the President's Circular Address to the profession in different parts of the State, and sent out 75 postal cards with printed statement of the Rail Road rates of charges for transportation of Delegates to this session of the Association.

Respectfully submitted.

BENJ. H. RIGGS, M. D.,
Sec. M. A. S. A.

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The Treasurer's annual report was then read, received and filed.

TREASURER'S REPORT.

W. C. JACKSON, M. D., Treasurer,

In account with Medical Association of the State of Alabama.

From March 27, 1873, *to April* 13, 1874.

	TO DUES OF MEMBERS,	DR.
Dr.	W. H. Anderson, Mobile	$ 10 00
"	W. D. Bizzell, Gainesville	10 00
"	Peter Bryce, Tuscaloosa	10 00
"	Henry W. Bassett, Huntsville	10 00
"	Jerome Cochran, Mobile	10 00
"	Wm. C. Cross, Cherokee	10 00
"	C. A. Crow, Moulton	10 00
"	Wm. Desprez, Tuscumbia	10 00
"	Louis W. Desprez, Russellville	10 00
"	John J. Dement, Huntsville	10 00
"	Ed. H. Founier, Mobile	10 00
"	Rhett Goode, Mobile	10 00
"	E. P. Gaines, Mobile	10 00
"	J. T. Gilmore, Mobile	10 00
"	J. F. Hill, Carrollton	10 00
"	William Hester, Tuscaloosa	10 00
"	W. Hollingsworth, Mobile	10 00
"	Robert D. Jackson, Selma	10 00
"	W. C. Jackson, Montgomery	10 00
"	W. A. Johnston, Uniontown	10 00
"	J. D. Johnston, Livingston	10 00
"	M. H. Jordan, Birmingham	10 00
"	G. E. Kumpe, Leighton	10 00
"	George A. Ketchum, Mobile	10 00
"	John Little, Jr., Tuscaloosa	10 00
"	James Kyle, Florence	10 00
"	N. P. Marlowe, Tuscaloosa	10 00
"	J. B. McMillan, Evergreen	10 00
"	A. A. McKitrick, Evergreen	10 00
	Amount carried forward	$290 00

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	Amount brought forward		$290 00
Dr.	E. D. McDaniel, Camden		10 00
"	G. A. Moses, Mobile		10 00
"	A. G. Mabry, Selma		10 00
"	R. F. Michel, Montgomery		10 00
"	G. Owen, Mobile		10 00
"	F. M. Peterson, Greensboro		10 00
"	F. A. Ross, Mobile		10 00
"	B. H. Riggs, Selma		10 00
"	E. A. Semple, Montgomery		10 00
"	S. P. Smith, Prattville		10 00
"	L. H. Sadler, Leighton		10 00
"	T. O. Summers, Greensboro		10 00
"	Caleb Toxey, Mobile		10 00
"	J. S. Weatherly, Montgomery		10 00
"	R. D. Webb, Livingston		10 00
"	R. Searcy, Tuscaloosa		10 00
"	J. P. Burke, Meridionville		10 00
"	J. S. Bankson, Jackson Co		10 00
"	A. J. Reese, Mobile		10 00
"	James Guild, Tuscaloosa		10 00
"	J. M. Godfrey, Sumterville		10 00
			$500 00

1873.		Cr.		
March	27.	By balance due, last report	$ 34 53	
"		By paid Dr. Jerome Cochran	101 00	
May	1.	" Dr. B. H. Riggs	20 00	
July	7.	" " "	20 00	
Sept.	22.	" Dr. Jerome Cochran	15 00	
	"	" Barrett & Brown, Circulars	4 50	
	"	" Offutt Bros., Stationery	3 45	
	"	" Treasurer's Expenses, Tuscaloosa	23 00	
	"	" James P. Armstrong, Printing Trans	265 75	$487 23
		Balance on hand		$ 12 77

All of which is respectfully submitted.

W. C. JACKSON,
Treasurer.

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The Censors' report being next in order, Dr. Jerome Cochran, Senior Censor, stated that the report was ready, but as the hour of adjournment had arrived, he moved that it be postponed, and that the Association adjourn to meet at 7½ o'clock this evening. Carried.

EVENING SESSION.

HALF-PAST SEVEN O'CLOCK.

The President in the chair.

Jerome Cochran, M. D., Senior Censor, read the First Annual Report of the Board of Censors.

On motion of Dr. Semple, the report of the Board was received and filed.

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FIRST ANNUAL REPORT

OF THE

Board of Censors of the Medical Association

OF THE STATE OF ALABAMA.

If we look around us we find at work everywhere in our unfortunate country, the agents of disorganization and destruction. Widespread and paralyzing demoralization pervades all the ranks and classes of our social and political communities. The peculiar civilization which was slowly taking definite shape amongst us, has been broken into fragments by the tremendous revolution through which we have passed; and whether we will it or not, it devolves upon us, out of these fragments, to build up another civilization for the times in which we ourselves live, and for the future which is to come after us. Whether we build wisely and well, or whether our work shall prove to be far otherwise than laudable and beneficent, depends very much upon ourselves. It is true, that many duties and obligations press upon us; and that the burden is hard to be borne. But shall we for this reason lose heart and hope, and lie down by the road-side, to perish like dumb-driven cattle, in ignominious apathy and despair? Nay, verily. We are men, and we will bear ourselves like men with manly courage and magnanimity. To fold our hands passively and take things as they come—this is not our mission; but to shape events for ourselves and to compel circumstances to pursue such course as we may believe to be wisest and best.

It is for this purpose that we have been endowed with intelligence and volition; that we have been made participants in the awful prerogatives of Jehovah, and have been associated with Him in the miraculous work of creation. Yea, verily! We are the builders of our own fortunes. What sort of country we shall have; what sort of civilization shall be developed among us; what sort of a profession ours shall be—all these depend upon the wisdom with which we make our plans, and the resolution and energy with which we push them into execution—out of the region of speculation into the region of

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accomplished facts. All in fact depends upon this, with what purpose we work and under what direction.

How full of philosophic thought are these lines of Emerson:

"The hand that rounded Peter's dome,
And grained the aisles of Christian Rome,
Wrought in a sad sincerity;
Himself from God he could not free;
The conscious stone to beauty grew;
He builded better than he knew."

So also shall it be with us, if we also work in sad sincerity. We shall build better than we know. But if we act under the influence of petty passions and selfish ambitions, then verily shall we find that we have sown dragon's teeth, which will spring up into armed men, and destroy us.

As men, we owe duties and obligations to our families and friends; as citizens, we owe duties and obligations to the State in which we live; as physicians, we owe duties and obligations to the profession which we have chosen. Let us see to it, that in all the relations of life, we do our duty. It is more the fashion now-a-days, to speak about rights and privileges than about duties and obligations; and this is one of the signs of the degeneracy of the times. But for all that, our great Confederate leader was right when he said: "Duty is the sublimest word in the language."

Social and political duties and obligations lie outside of our province; and we shall therefore confine ourselves to the consideration of our duties and obligations as members of the Medical Profession, and of the Medical Association of the State of Alabama.

The wide-spread demoralization of which we have spoken, pervades also the ranks of our profession. We need not stop to prove it. It is seen and known and regretted of all of us. The Profession is crowded with incompetent men; and other incompetent men are continually gaining admission to it. Shall this state of affairs be allowed to continue? Shall the Profession be allowed to go on from bad to worse indefinitely?

We have no hesitation in saying that the Medical Profession is fully able to bring about a reformation of all the evils from which it suffers. But this consummation most devoutly to be wished, cannot be accomplished by wishing—cannot be accomplished either by means of paper resolutions and grandiloquent speeches—can indeed be accomplished only in one way, namely: by wise and resolute work, and by thorough organization and concert of action among the members of the Profession.

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To construct out of the scattered members of the Profession a powerful organization, and through this organization to secure concert of action and the prevalence of wise and prudent counsels—this is the mission of our Association.

We have just adopted a new constitution. Many of its provisions seem strange to many. Whether it has been in all things wisely planned or not, time will show. For the present, both good faith and good policy demand that we shall all give it an earnest and loyal support. Other plans of organization have been tried for many years together, and certainly with no result of which we have any reason to be proud. The friends of this new plan believe that it will lead us through the wilderness of despair in which we have journeyed so long, into the promised land of professional regeneration, which all of us have looked forward to with unsatisfied yearning. If it fails, it adds only one more to the sum of the failures we have already to lament. If it succeeds, no monuments of marble in our public places—no monuments of affection in our hearts—can ever adequately express our obligations to those who have originated and carried it into execution. Without pretending to forecast the result, we take leave to press upon the Association the importance of having the experiment fairly made. We deprecate not only factious opposition, but also imprudent and inconsiderate zeal.

At the annual session of the Association in Huntsville, in 1872, the plan of a general system of Boards of Health for this State, which was submitted by Dr. Jerome Cochran for the consideration of the Association, was discussed and endorsed. It was also again endorsed by the unanimous vote of the Association at the annual session in Tuscaloosa in 1873.

A bill has been prepared, embracing the details of this plan, and was presented to the General Assembly of the State during its last session. It was received with a considerable amount of favor; but for reasons not necessary to be explained, it was never voted on. We believe that this bill, if its provisions should be adopted, is calculated to be of great service to the State, and to the prosperity and influence of this Association. It is therefore presented here in full.

We respectfully recommend that this bill be endorsed by the Association, and that all the members of the Association recommend it to the favorable consideration of such members of the General Assembly as they may be able to influence. (See Document "A.")

Another subject of very great importance to the Medical Profession and to the welfare of the people of the State is, the regulation of the practice of Medicine so as to secure the just rights of the regular Profession, and restrict

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the various systems of quackery and irregular medicine within the narrowest possible limits. With this object in view, we have prepared the draft of a bill which we submit for the consideration of the Association. We suggest that it will be best for this bill to lay over until the next meeting of the Association, before it is taken up for discussion. The subject is one of very great difficulty, and no decided measures should be taken in regard to it without mature deliberation.—(See Document "B.")

It is desirable that the formal relations between the State Association and the County Societies which are contemplated in the Constitution, should be established without any unnecessary delay. We therefore suggest that it would be well for the County Societies generally to submit at the next annual session of this Association, copies of their Constitutions, and rolls of their officers and members as a basis upon which appropriate charters may be issued.

A form of charter has been prepared, and is herewith submitted to the judgment of the Association.—(See Document "C.")

While we have deprecated very gravely any interference with the Constitution of the Association, and for the reasons which we have stated, there is one point in which it requires modification in order that its several provisions may harmonize with one another. If Article 8 and Article 67 be compared together, it will be seen that they are incongruous and contradictory. We therefore propose now, in order that it may be acted upon at the next annual session, the following amendment to the Constitution, namely:

That Article 8 of the Constitution be stricken out, and that another Article, in the words following be substituted, to-wit:

ART. 8. Delegates shall be elected by the County Societies to represent them in the Association; and each County Society shall be entitled to two delegates, whose term of service shall be for one year.

By Article 19 of the Constitution, it is made the duty of the Board of Censors to make recommendations of persons to be correspondents of the Association. We are of opinion that this honor should not be lightly conferred. Honors that are showered about promiscuously cease to be honors. We have thought it well, however, to recommend for this distinction at the present session, the names of three gentlemen, who have some claims upon us, and whom we esteem to be worthy of being so honored, namely:

Dr. John S. Lynch, formerly of Clifton, Alabama, and a permanent member of this Association; now a resident of Baltimore, Maryland, where he occupies the position of Professor of Anatomy in the Washington Medical College.

Dr. G. A. Moses, formerly of Mobile, Alabama, and a Counsellor of this Association; now a resident of St. Louis, Missouri, where he has been ap-

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pointed to deliver a summer course of Lectures, on the Diseases of Children, in the Medical College of St. Louis.

Dr. Walter P. Reese, of Selma, who has done faithful service for the Association for more than ten years required by the Constitution, and who is now under the necessity of severing his active connection with it.

There is no subject which we approach with greater reluctance than the election of new Counsellors. But as it is of great importance that the election of Counsellors should be conducted upon proper principles from the beginning, so that no embarrassing precedents may be established to give the Association trouble hereafter, we feel that it is not improper in us to make some suggestions in regard to it.

It must be borne in mind that the number of Counsellors has been wisely restricted to one hundred, and that, consequently, in order that they may be distributed generally over the State, the number that can be given to any one county is necessarily small. Justice and good policy both demand that this sort of general distribution should be made.

It is further to be remembered that the honors and offices of this Association have been created for the benefit of the Association itself, and not for the gratification of any man's personal ambition ; that they are properly the rewards of service faithfully done for the Association, and of general professional ability and eminence. There is nothing that ought to be more sternly condemned by this body than the disposition, so frequently manifested among men, of grasping after honors to which they have no just claim. It will be well for us then, if we lay it down as an inflexible rule, that the office shall seek the man, not the man the office.

In view of the principles here stated we respectfully, but most earnestly recommend that no haste be made to fill up the roll of Counsellors ; that no additional Counsellors be elected at this session from any county which has already as many as three upon our roll ; and that one Counsellor at least shall be elected at this session from every county represented in it, which as yet has no Counsellor at all.

There is another recommendation which we feel it to be our duty to make. Our Association is now firmly established, and our future volumes of transactions are sure to be large and of permanent value. It is therefore important that they should be well printed, and in uniform style. To secure this end we recommend that two other persons shall be appointed by the President of the Association to constitute, with the Secretary, a Publishing Committee ; that these appointments be made with such reference to location, fitness, knowledge of printing, and so forth, as will give promise of the greatest possible efficiency

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of the committee; and that the President shall, also, fill all vacancies in the committee whenever they occur.

We have examined the accounts and vouchers of the Treasurer of the Association and find them to be correct.

We have examined the reports and accounts of the Secretary of the Association and find them to be correct.

In order that the Association may be able to act with convenience and dispatch upon the recommendations, which we have made, we attach to this report a series of resolutions, in which these recommendations are briefly embodied.

Done at the Annual Session of the Association, at Selma, on the 13th day of April, *Anno Domini*, 1874.

JEROME COCHRAN, M. D.,
RICHARD FRASER MICHEL, M. D.,
GEORGE ERNEST KUMPE, M. D.,
Board of Censors.

DOCUMENT A.

AN ACT TO ESTABLISH BOARDS OF HEALTH IN THE STATE OF ALABAMA.

SECTION 1. *Be it enacted by the General Assembly of the State of Alabama*, That the Medical Association of the State of Alabama, organized in accordance with the provisions of the Constitution, which was adopted by said Association at its annual meeting, in the city of Tuscaloosa, in March, 1873, be and is hereby constituted the Board of Health of the State of Alabama.

SECTION 2. That the Board of Health of the State of Alabama, thus established, shall take cognizance of the interests of Health and Life among the people of the State; shall investigate the causes and the means of prevention of endemic and of epidemic diseases; shall investigate the influences of localities and employments upon the public health; shall from time to time make to the General Assembly such suggestions as to legislative action as in their judgment may seem advisable; and shall be, in all ways, the medical advisors of the State.

SECTION 3. That they shall make to the Governor and General Assembly of the State an annual report of their investigations and transactions; of which annual report they shall annually publish a sufficient number of copies for distribution among the members of the General Assembly, and for such further distribution, among the physicians of the State, and in exchange for the reports and transactions of other Boards and Associations, as they shall

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think advisable; and to defray the expenses of this publication there shall be paid annually out of the Treasury of the State to the Treasurer of the said Board of Health of the State of Alabama, upon the requisition of the President and Secretary thereof, the sum of one thousand ($1,000) dollars.

SECTION 4. That the County Medical Societies, in affiliation with the Medical Association of the State of Alabama, and organized in accordance with the provisions of the Constitution of the said Association, as described in the first section of this act, be and are hereby constituted Boards of Health for their respective counties; and, as such, shall be under the general direction of the Board of Health of the State of Alabama, created by the first section of this act.

SECTION 5. That the County Boards of Health, thus established, shall have only advisory powers, and shall be conducted without expense to the State or to their respective counties, except under the conditions provided for under the sixth section of this act, which here follows:

SECTION 6. That the competent legal authorities of any county in this State, or of any incorporated town or city of any such county, shall, whenever in their judgement it becomes expedient to do so, proceed to invest the Board of Health of the county, with such executive powers and duties for the public health, and under such rules and stipulations as shall be agreed upon between the two parties.

SECTION 7. That in any such agreement, as is contemplated in section six of this act, the right to elect or appoint the officers and servants employed in the administration of the sanitary regulations so agreed upon shall in all cases be reserved to the Board of Health; and further, That all questions relating to salaries, appropriations, and expenditures shall be reserved to the legal authorities of the county, town, or city, as the case may be,

SECTION 8. That no Board of Health, or advisory, or executive medical body of any name or kind for the exercise of public health functions, shall be established by authority of law in any county, town, or city of this State, except such as are contemplated by the provisions of this act, the object of this prohibition being to secure a uniform system of sanitary supervision throughout the State. But nothing in this article shall be so construed as to prevent any of the Boards of Health created by section four of this act from accepting and executing any special powers that may be granted them by the General Assembly of the State.

NOTE.—This document is printed as amended and approved by the Association.—SEC'Y.

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DOCUMENT B.

An Act to Regulate the Practice of Medicine in the State of Alabama.

Section 1. *Be it enacted by the General Assembly of the State of Alabama*, That no person shall be permitted to practice medicine, as a profession and means of livelihood, in any of its branches or departments, in this State, without having first obtained a Diploma or Certificate of Qualification from some authorized Board of Medical Examiners as hereinafter provided.

Section 2. That the Board of Censors of the Medical Association of the State of Alabama, organized according to the Constitution of the said Medical Association of the State of Alabama which was adopted at its annual meeting, in the city of Tuscaloosa, in March, 1873; and the Boards of Censors of the several County Medical Societies, which are in affiliation with the said Medical Association of the State of Alabama and organized in accordance with the provisions of the Constitution just mentioned; and the Faculties of all Regular Medical Colleges holding charters from the General Assembly of the State of Alabama, and recognized as in good standing by the said Medical Association of the State of Alabama; be and are hereby constituted the authorized Boards of Medical Examiners referred to in the first section of this act.

Section 3. That the standard of qualifications required of persons desiring to practice medicine in this State, together with the rules for the government of the authorized Boards of Medical Examiners, shall be determined from time to time by the Medical Association of the State, in accordance with the provisions of its said Constitution of 1873.

Section 4. That every Diploma or Certificate of Qualification, authorizing any person to practice medicine in this State, which shall be issued by any authorized Board of Medical Examiners, shall be presented to the Probate Judge of the county in which said person resides, who shall officially endorse the same, and seal it with the seal of the county, and for this service he shall be entitled to a fee of one dollar. And further, That every such Certificate or Diploma shall be presented to the Probate Clerk of said county, who shall make, in a well bound book kept for that purpose, and called the "Register of Licensed Practitioners of Medicine," a full and fair copy of the same, together with the endorsement of the Probate Judge, and for this service he shall be entitled to a fee of one dollar.

Section 5. That if any person, holding a Certificate or Diploma to practice medicine from any authorized Board of Medical Examiners, shall be charged, in regular form, with any grossly immoral, ungentlemanly, or unprofessional conduct, he shall be summoned before said Board of Medical Examiners to

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answer to said charge ; and if after fair trial, and with the right of appeal, according to the provisions of section sixteen of the Constitution of the Medical Association of the State, he shall be adjudged to be guilty, as charged, then his Certificate or Diploma shall be revoked ; and of this revocation the County Clerk shall be officially notified by the Board of Medical Examiners, and he shall endorse said revocation across the face of the Record of the Certificate or Diploma, in the Register of Licensed Practitioners of Medicine, kept in his office ; and after this, said person shall be debarred from the further practice of medicine in this State, and shall become liable to all the penalties of this act hereinafter provided.

SECTION 6. That any person practicing medicine in this State in violation of any of the provisions of this act shall be guilty of a misdemeanor, and upon conviction thereof before any court having competent jurisdiction shall be fined in the sum of not less than fifty ($50) dollars nor more than five hundred dollars ($500) for every such offence, one-half of said fine to be paid to the prosecutor, and the other half to the county treasury ; and if the fine so imposed be not immediately paid, said person shall be imprisoned in the county jail for not less than one month nor more than one year for every such offence.

SECTION 7. That all persons who shall be actually engaged in the practice of medicine in any county of this State before the organization of the Board of Medical Examiners in said county, and who hold the diploma of Doctor of Medicine from a regular medical college, shall be entitled to the certificate of the Board of Medical Examiners and to be inscribed in the "Register of Licensed Practitioners of Medicine," without examination as to qualifications.

SECTION 8. That all persons who shall be actually engaged in the practice of medicine in any county of this State before the organization of the Board of Medical Examiners in said county, and who practice any irregular system of medicine so as not to be recognized by the Board of Examiners as regular physicians, shall be licensed and registered by the Probate Judge in such manner and form as he may himself elect ; and all such irregular practitioners so licensed and registered by the Probate Judge of any county shall be exempt from any and all of the penalties provided in section five of this act.

SECTION 9. That none of the provisions of this act shall apply to persons practicing Homeopathy, when such persons are graduates of regular medical colleges, or of homeopathic medical colleges.

SECTION 10. That the provisions of this act shall take effect in any county of this State whenever the Board of Medical Examiners for said county shall have been organized as hereinbefore provided, and the fact of such organization

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officially communicated to the Probate Judge of said county by the Board of Censors of the Medical Association of the State.

SECTION 11. That all laws and parts of laws in conflict with the provisions of this act, be and the same are hereby repealed.

REPORT OF THE SENIOR CENSOR ON THE ROLL OF COUNSELLORS.

At the Annual Session of the Association in Tuscaloosa, last year, a resolution was adopted in the terms following, namely:

Resolved, That in order to determine the composition of the House of Counsellors, Dr. Jerome Cochran, as Senior Censor of the Association, be requested to address a Circular Letter to all who are now eligible for permanent membership under the old Constitution, explaining the conditions upon which they may become Counsellors under the new Constitution. All who elect to accept the position of Counsellor to forward their names to the Senior Censor for registration on the Roll of Counsellors; and to forward to Dr. W. C. Jackson, the Treasurer of the Association, the fees for the current year, if not already paid.

I have now to report that I have complied with the instructions of this resolution, and that the following named gentlemen have signified to me their willingness to accept the position of Counsellor, with its duties and responsibilities, namely:

Dr. WILLIAM HENRY ANDERSON, Mobile.
Dr. J. S. BANKSON, Stevenson.
Dr. HENRY W. BASSETT, Huntsville.
Dr. WILLIAM D. BIZZELL, Gainesville.
Dr. PETER BRYCE, Tuscaloosa.
Dr. J. P. BURKE, Meridionville.
Dr. JEROME COCHRAN, Mobile.
Dr. WILLIAM C. CROSS, Cherokee.
Dr. CALVIN A. CROW, Moulton.
Dr. JOHN J. DEMENT, Huntsville,
Dr. WILLIAM DESPREZ, Tuscumbia.
Dr. LOUIS W. DESPREZ, Russellville.
Dr. EDMOND H. FOURNIER, Mobile.
Dr. EDMUND PENDLETON GAINES, Mobile,
Dr. JOHN TAYLOR GILMORE, Mobile.
Dr. RHETT GOODE, Mobile.
Dr. JAMES GUILD, Tuscaloosa.
Dr. WILLIAM HESTER, Tuscaloosa.

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Dr. Samuel Henry Hill, Carrolton.
Dr. Wyatt Hollingsworth, Mobile.
Dr. Walter Clarke Jackson, Montgomery.
Dr. Robert D. Jackson, Selma.
Dr. William A. Johnson, Uniontown.
Dr. John David Johnson, Livingston.
Dr. Mortimer H. Jordan, Birmingham.
Dr. George A. Ketchum, Mobile.
Dr. George Ernest Kumpe, Leighton.
Dr. James Kyle, Florence.
Dr. John Little, Jr., Tuscaloosa.
Dr. Albert Gallatin Mabry, Selma.
Dr. Nicholas P. Marlowe, Tuscaloosa.
Dr. Adam Alexander McKittrick, Evergreen.
Dr. John B. McMillan, Evergreen.
Dr. Edward Davies McDaniel, Camden.
Dr. Richard Fraser Michel, Montgomery.
Dr. Gratz A. Moses, Mobile.
Dr. Goronwy Owen, Mobile.
Dr. Francis M. Peterson, Greensboro.
Dr. A. J. Reese, Mobile.
Dr. Benjamin Hogan Riggs, Selma.
Dr. Frank Armstrong Ross, Mobile.
Dr. Lewis H. Sadler, Leighton.
Dr. Edward Armisted Semple, Montgomery.
Dr. Samuel Parrish Smith, Prattville.
Dr. Thomas O. Summers, Jr., Greensboro.
Dr. Caleb Toxey, Mobile.
Dr. Job Sobiesky Weatherly, Montgomery.
Dr. Robert Dickens Webb, Livingston.

This makes in all a list of forty-eight names.

The Publishing Committee are mistaken, along with the Treasurer, as to the accidental omission from the roll of the names of Dr. R. Searcy, and Dr. G. M. Arnold. I made the omissions intentionally. Dr. Searcy declined to accept the position, and Dr. Arnold had removed to the city of New York before the roll was prepared. There is a mistake in the name of Dr. Hill, of Carrollton, in the published Roll. The correct initials are S. H., for Samuel Henry, not S. F.

I may add that I took a great deal of trouble in the discharge of the duty

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imposed upon me; and it will be a matter of regret to me if I have omitted from the list any name that ought to have been included in it.

I have to state further, for the information of the Association, that of the forty-eight names which I have reported three must now be subtracted. Dr. Mabry is dead; Dr. Hollingsworth has gone to Florida; Dr. Moses has moved to St. Louis. So that the Roll of Counsellors now consists of forty-five names.

All of which is respectfully submitted.

JEROME COCHRAN, M. D.,
Senior Censor, M. A. S. A.

The Senior Censor reported the following resolution as coming from the Board of Censors:

Resolved, That the plan for the organization of Boards of Health in the State of Alabama, submitted by the Board of Censors, receives the hearty endorsement of this Association; that the Board of Censors be, and are hereby instructed to present it to the General Assembly of the State at its next session; and that the members of this Association pledge themselves to use their influence with the members of the General Assembly to secure its enactment as a law of the State.

Dr. Semple offered the following amendment:

Resolved, That the Board of Health bill be referred to the committee on the President's address, and that said committee be increased from three to five members. Lost.

Dr. Gaston raised the point of order, whether the Board of Censors had the right to originate bills. He thought all bills should originate in the Association; that the power to originate business did not belong to the Board. He raised this point in order to settle the question and establish a precedent.

The President decided the point well taken.

On Motion of Dr. Gaston, the Association then proceeded to the consideration of the Board of Health bill, as reported by the Board of Censors.

Dr. Smith moved to take up the bill and consider it by sections. Carried.

Section 1.

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Dr. Webb inquired who was the executive officer under the bill.

Dr. Cochran explained that the officers of the Association were also the officers of the Board; there was at present no practicable way to obtain a Health Officer; but there was nothing in the bill to prevent this being done after awhile.

Drs. Weatherly and Smith discussed the legislative appropriation feature. Thought it might be best at present to have an unpaid board.

Section 1. Adopted.

Section 2. Adopted.

Section 3.

Dr. Gaines moved that this section be amended by leaving out a specified sum.

Dr. Cochran thought that the amendment should be voted down, as it was necessary to name some specific sum, or it would have to be done by the Legislature for us; neither did he think it comported with the dignity of the Association to accept a ridiculously small sum. Amendment lost.

Section 3. Adopted.

Section 4. Adopted.

Section 5.

Much animated discussion was had upon the practical bearing and operation of this section, in which its bearing upon the rights and powers of municipal corporations and chartered Medical Societies were considered. Drs. Clark, Cochran, Weatherly, Webb and Seelye took part in the discussion.

Dr. Garnett moved that further consideration of the Board of Health bill be postponed until the hour of meeting to-morrow. Carried.

Dr. Cochran offered the following:

Resolved, That the President shall appoint, in addition to the Secretary of

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the Association, who is *ex-officio* Chairman of the Publishing Committee, two other members of the Association to complete the organization of said Publishing Committee; that these appointments be made as to locality and fitness, with a view to securing the publication of the Transactions in an appropriate and uniform style of typography; and that the President shall fill vacancies in said Publishing Committee whenever they occur.

Adopted.

Resolved, That the Publishing Committee be authorized to determine what papers or parts of papers shall appear in the transactions.

Dr. Riggs stated that he did not see the use of the resolution, the Secretary was *ex-officio* Chairman of the Publishing Committee and he had all the work to do in preparing the volume of Transactions; he did not see the necessity of having any one on the Committee with him; they would certainly be no help to him if they were located away from him, and very little if near him. He moved to lay the resolution on the table.

Dr. Cochran argured at length in favor of the first resolution.

The motion to lay on the table was lost, and the first resolution adopted. The second resolution was opposed by Dr. Gaines, and rejected by the Association.

The President announced the following as the Committee on the President's address: Drs. J. S. Weatherly, George E. Kumpe and C. J. Clark.

The Association then adjourned to 9 A. M. to-morrow.

SECOND DAY.

TUESDAY, April 14th, 1874.

The Association met, April 14th, pursuant to adjournment, at the Hall of the Y. M. C. A., and was called to order by the President, Dr. Ketchum, at 9 o'clock A. M.

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The roll was called and the minutes of yesterday read and approved.

The consideration of section 5 of the Board of Health bill was then in regular order, resumed.

The Senior Censor stated that this section had been so amended as to make it conform to the suggestions of the gentlemen who participated in the discussion last evening without mutilating the bill.

He moved to reconsider section 4 in order to alter certain words therein in order to conform it to this change.

Adopted.

He then moved to strike out certain parts of section 4.

Adopted.

Section 4, as amended, was then adopted.

Section 5 was now adopted.

Sections 6 and 7 were adopted.

Section 8 was amended and adopted.

The bill, in its amended form, was then adopted.

The following resolution was then adopted unanimously by the Association :

Resolved, That the plan for the organization of Boards of Health in the State of Alabama, submitted by the Board of Censors, and amended by the Association, receives our hearty endorsement; that the Board of Censors be and is hereby instructed to present it to the General Assembly of the State at its next session; and that the members of this Association pledge themselves to use their influence with the members of the General Assembly to secure its enactment as a law of the State.

Dr. Dement moved that the Publishing Committee be instructed to publish 1,000 copies for distribution this summer.

Dr. Cochran moved to amend by substituting 500 copies, and that the same number of copies of the President's address be published with it.

Amendment adopted.

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The form of charter for County Medical Societies was then submitted by the Senior Censor.

DOCUMENT C.

THE MEDICAL ASSOCIATION OF THE STATE OF ALABAMA.

The Charter of the Medical Society of the County of Mobile.

The Medical Society of the County of Mobile, with the officers and members following, to-wit:

And with a Constitution which has been approved by our Board of Censors is by these presents admitted into the fellowship of the Medical Association of the State of Alabama.

Done, in Annual Session, in the city of Selma, A. D. 1874, on the 15th day of April. Signed by the President and the Secretary, and sealed with the seal of the Association.

Resolved, That the form of Charter for County Societies, presented by the Board of Censors, be and is hereby approved by the Association.

Adopted.

Dr. Bradfield inquired what relation local societies, under the Constitution, bore to the Association.

Dr. Cochran stated that the Constitution contemplated the organization of one chief County Society; other societies in the county were to be subordinate to this one; hoped that a spirit of concord and harmony would induce all societies, where any difficulty seemed to exist, to make an attempt to reconcile it, as he had no doubt they could do, if they tried in a proper spirit, looking alone to the general good of the profession. He spoke at length in favor of securing co-operation in the attempt to perfect the machinery of the Association, which was bound, in an organization of this size, to be very complex and difficult, at first, to set in successful operation.

Drs. Johnston and Dozier also took part in the discussion.

The following delegates now appeared and registered:

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Perry County Medical Society.—W. T. McAllister, M. D. J. C. Dozier, M. D.

Sumter County Medical Society.—J. H. Michael, M. D., and Dr. R. H. Dugger from Hale County.

Reports from County Societies—5th order of business—was now called for.

Dr. J. P. Furniss read the report of the Selma Medical Society, which was received and filed.

Dr. Cochran moved that the Selma Medical Society be regarded by this Association as the Dallas County Medical Society, according to their request. Adopted.

It was ordered that all County Societies which were not now ready to report, be allowed to do so any time during the session.

The report of the Mobile Medical Society was submitted by Dr. Cochran, a Counsellor from Mobile county.

Dr. Cochran offered the following resolution, which was adopted:

Resolved, That the two reports sent up by the Mobile Medical Society, in relation to Medical ethics, be printed in the transactions.

Regular Reports on Diseases—7th order—was now called for.

Dr. Dement, of Huntsville, "On the recent Epidemic of Cholera," made a satisfactory statement why he was not prepared now to report, and asked permission to finish his paper and hand it to the Publishing Committee. Granted.

The three following papers being correlated, were next read in immediate succession:

Dr. R. F. Michel, of Montgomery, "On the Yellow Fever in Montgomery," in 1873.

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Dr. Jerome Cochran, of Mobile, "On the Recent Epidemic of Yellow Fever."

The Association now took a recess of fifteen minutes. On re-assembling, Dr. W. H. Anderson, of Mobile, read a report "On Dengue."

A very interesting discussion followed the reading of these papers, the most salient points of which were the following:

Dr. E. P. Gaines, of Mobile, said that he did not believe that Yellow Fever and Dengue were so markedly distinct as the essayists would have us believe; hæmorrhage was not pathognomonic, as he had seen a case of Dengue with dreadful hæmorrhage from the nose. His only positive means of diagnosis was the thermometer; if the fever was continuous, it was yellow fever; if not, it was dengue or bilious fever. The urine is no guide, except when hæmaturia occurs. There are no pathognomonic symptoms of yellow fever; no symptom or set of symptoms by which you can tell it from other fevers. He dwelt upon the fact that it was a disease of but one paroxysm. He attributed the success of the Mobile physicians in the treatment of yellow fever in the last epidemic, to the early use of large doses of quinine, even in the height of the fever; he gave 20 grains of quinine to a plethoric man with high fever, with the effect of cutting it short. Quinine was an antipyretic, and should be used as such. He also used quinine in dengue; first tried to secure tarry degecta by purgatives. Quinine was the best remedy for this disease also. In fact, when we Southern physicians become better versed in the uses of quinine, we will be better and more successful doctors.

Dr. Michel replied briefly in support of the views advanced in his report; did not believe Dengue was ever a hæmorrhagic

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disease; had seen epistaxis follow ordinary headache; in fact, the most terrific case he ever saw was caused by headache.

Dr. Gaston asked if the authors of papers on yellow fever regarded the terms infection and contagion as synonymous. He thought that high authorities had made a distinction between these terms; that the term contagion had not been restricted to its etymological signification, but had been applied to a poison, produced by disease in living beings, possessing the power of inducing like morbid actions in other healthy living beings, either by contact, near approach or through the medium of external bodies, such as fomites and the atmosphere, impregnated with the poison; that infection had been applied to a poison not portable by the sick or convalescent, not communicable, and not produced as above mentioned; but originating in a concurrence of dead animal or vegetable matter, and dynamic agencies external to living animals. He thought if these terms had been used by high authorities on yellow fever, the one—contagion—to designate a poison of foreign origin, portable and communicable from individual to individual; and the other—infection—to designate a poison of domestic origin and not communicable from the sick to the healthy, that it might be well not to disregard such distinctions.

Dr. Cochran said if we examined the etymological meanings of the words, there was but a shade of difference; he preferred the word infection as being more in accordance with his views; he thought that the cause of yellow fever was conveyed through the air and obtained ingress into the human body; never uses the word contagion at all; speaks of syphilis as infectious, thinks it much more philosophical to class all these diseases as infectious; every disease that was due to the introduction of a material body into the organism, was infectious.

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Dr. T. C. Osborn, of Greensboro, "On Great Malarial Epidemics," had not prepared a report, but begged leave to report a case of Lupus Exedens of the face in a young white girl, lately treated successfully by him, when the girl arrived, whom he expected by the next train. Leave was granted.

On motion, it was directed that the House of Counsellors meet in the Hall at 6 o'clock this evening. The Association then adjourned to meet at 9 A. M. to-morrow, with the understanding that they meet here at half after seven this evening, to attend in a body the Annual Oration.

THE ANNUAL ORATION,

Which may be found in its proper place, was delivered by the Orator, Dr. S. D. Seelye, of Montgomery, at the Methodist Church, on Church street, on Tuesday evening, at 8 o'clock, to a large and attentive audience of ladies and gentlemen, the choir of the Church furnishing some good music, accompanied by their splendid organ. The officers of the Association were arranged on the platform near the speaker.

THIRD DAY.

WEDNESDAY, April 15th, 1874.

The Association met pursuant to adjournment on Wednesday, April 16th, at the Hall of the Y. M. C. A., and were called to order by the President, Dr. Ketchum in the chair, at 9 o'clock.

The roll was called, and the minutes of the previous session were read, amended and approved.

The President, before proceeding to the regular order of

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business, announced to the Association that he had the pleasure of reading to them the following dispatch of greeting from the Medical Association of South Carolina, now in session at Columbia.

DISPATCH,

COLUMBIA, S. C., April 14, 1874.

To the President of the Medical Association of Alabama:

The South Carolina Medical Association, now in session, sends cordial greetings and many wishes for a prosperous career, to the Alabama Medical Association.

S. BARUCH, M. D., President.

Dr. R. F. Michel arose in his place and made the following reply, viz:

Mr. President and Gentlemen of the Association:

It affords me much pleasure to reply to the telegram just read in your hearing. That our efforts in behalf of the advancement of Science should be recognized by such an organization as the Medical Association of the State of South Carolina, is a compliment indeed. To me it is peculiarly grateful. A native of that noble State, one who loves her sacred soil with the devotion of a true and loyal son, I feel that I would be recreant to my duty did I not promptly give utterance to my feelings.

For many years I was a Counsellor of that learned body of men, which has now been in organization nearly thirty years; every page of whose history is marked by the names of Moultrie, Whiley, Dickson, Geddings, Frost, Prioleau, Cain, Gibbes, Hume, Simmons, Horlbeck, and Gaillard.

Its reorganization since the war has been eminently successful, and its annual volume of transactions exceedingly creditable. With the hope that the Association will endorse the answer, I will now read the telegram prepared.

All hail!!! To the Medical Association of the old Palmetto State. May her future medical history equal her noble record in the past. Alabama acknowledges your greeting!!

The regular order of business—Reports on Diseases—was now resumed.

The report by Dr. A. G. Mabry, of Selma, "On the History

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of the State Medical Association, and Medical Progress in Alabama," was not prepared in consequence of his death.

Dr. J. T. Gilmore, of Mobile, "On Recent Progress in Surgery," made no report, for reasons set forth in the following letter:

"Please express to the Association my regrets at not being able to be present on this, the present occasion of their meeting. I had made all my arrangements to attend, but suddenly and unexpectedly professional claims here rendered it impossible for me to be absent from the city. Allow me, through you and the worthy President, to beg of the Association the privilege of writing on any subject which I can illustrate by cases. With this privilege, I will and can get up something worthy of the transactions. The Aspirator and its Uses, and Esmarch's bandage and tourniquet, the most deserving of the surgical innovations that are not yet embodied in the text books. Wishing for the Association a pleasant reunion and a profitable return to the profession, I remain

"Very truly yours,

J. T. GILMORE, M. D."

Dr. Gaines moved that the request of Dr. Gilmore be granted.

Dr. Cochran opposed the granting of the request, as establishing a troublesome precedent; the Publishing Committee having no discretionary powers, it was necessary that papers be submitted to the Association.

The motion was lost.

Dr. H. W. Bassett, of Huntsville, who was to report "On Recent Progress in Gynæcology," was not able to do so on account of removal from the State, and the Secretary had a letter from him to that effect.

Dr. L. W. Desprez, of Russellville, "On the Medical History of the Tennessee Valley," asked until the next annual session to prepare his report, on account of not being as yet able to collate all the facts. Granted.

Dr. Thos. O. Summers, of Greensboro, read his report "On

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the Contributions of Physics and Chemistry to Practical Medicine."

Dr. E. D. McDaniel, of Camden, next read his report "On Hæmorrhagic Malarial Fever in Alabama."

Dr. Michel thanked the reporter for his able paper; he attributed the occurrence of the disease to increased abundance of malaria, caused by neglected drainage, ditches, etc. He did not think the disease ever occurred without previous chills.

Dr. Webb stated that he had seen three cases without any previous visible manifestation of malarial poisoning. He had seen the disease prevail in a dry and well-drained portion of Sumter county, where there was no moisture or factors of malaria, as now received; he did not think the term icterode was correct; did not believe the liver was involved to much extent; the spleen was the cause of the trouble; the hue of the skin was due to changed blood; he dwelt upon this view of its pathology, because he thought it was important in the treatment. He regarded Quinine as the great remedy; had given it in very large doses successfully, as reported by him to the Association last year, and as published in the last volume of Transactions; he disregarded the increase of the hæmorrhage by quinine; pushed the quinine still until the fever was subdued.

Dr. Osborn stated that he had had the disease himself without any previous chills; the only case he had seen of this sort in about three years' time. He regarded the "cold dash," (cold water) used freely, as a great remedy; used a bucket full if necessary. He also relied upon quinine; would not treat a case without it.

The Association, on motion, now took a recess of fifteen minutes.

On reassembling, the reading of reports was resumed.

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Dr. P. Bryce, of Tuscaloosa, read a report "On State Patronage of Asylums and Hospitals."

Dr. Cochran said he thought the Association was under obligations to the reporter for the thoughtful and carefully prepared report just read. He spoke upon the feature advanced by the essayist, of a State Medical School, and offered the following resolution, which was adopted by the Association:

Moved, That Dr. P. Bryce be appointed to prepare, for the consideration of this Association at its next annual session, in the form of a bill for presentation to some subsequent meeting of the General Assembly of the State, a systematic statement of the plan in relation to a State Medical College, and a higher standard of acquirements as a prerequisite to the degree of Doctor of Medicine, and the right to practice medicine in this State.

Drs. Webb and Weatherly discussed the recommendations of the reporter.

Dr. J. S. Weatherly, of Montgomery, now proceeded to read, by permission of the Association an essay on the Minute Anatomy and Diseases of the Cervix Uteri, instead of his regular report "On Recent Progress in Practical Medicine."

Dr. M. H. Jordan, of Birmingham, next read a report "On the Recent Epidemic of Cholera in Birmingham."

Dr. F. M. Peterson, of Greensboro, by permission of the Association, in place of his regular report, read a paper "On "Eclampsia Puerperalis."

Dr. Bradfield endorsed the recommendation of the use of chloroform to prevent puerperal convulsions; reported two cases that were relieved by it; one died subsequently of exhaustion.

Dr. Semple advocated the early use of chloroform in labor; believed its early use prevented convulsions and peritonitis.

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On motion, it was resolved that half-past seven to-night be set apart for the reading of two papers sent up from the Mobile Medical Society.

On motion, it was ordered that what papers and reports remained on the Secretary's desk be referred to the Publishing Committee.

The Association now adjourned.

EVENING SESSION.

HALF-AFTER SEVEN O'CLOCK.

The President in the Chair.

Dr. Weatherly submitted the following report:

The Committee to whom was referred the President's address beg leave to report—

That the whole address of the President, treating as it does of public hygiene and State medicine, is not only of vital importance to the profession, but is of still greater interest to the people at large.

The action of the Association, at its present session, in perfecting a plan for the systematic supervision of the sanitary interests of the State, which is to be submitted to the General Assembly and which being in entire accordance with the suggestions and recommendations of the President, relieves the Committee of the duty of recommending any special course of action with reference to these subjects.

In the matter of the registration of deaths, births and marriages, and the preparation of vital statistics generally, every one must recognize that data of this sort are, in many ways, of great value to the national interests of the State. For the present, probably no better, or more appropriate, machinery can be desired, for the accomplishment of this purpose, than that which is offered in the plan of sanitary supervision, which has already been adopted by the Association.

As a means of inviting the attention of the people of the State, and the attention of the General Assembly to these subjects, we recommend that one thousand copies of the President's address be printed for general distribution,

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as a means of giving the people some idea of a subject so nearly concerning their vital and material prospects.

We further suggest that the local societies be asked to lend their active co-operation as societies; and through their individual members, to lend their aid to the State Association in its efforts to give the proper direction to public opinion and to secure favorable action on the part of the General Assembly.

All of which is respectfully submitted.

J. S. WEATHERLY,
C. J. CLARK,
G. E. KUMPE.

This was followed by the reading of the following letter from Rev. B. F. Larrabee, of Tuscaloosa, on the unjust discrimination of Northern life insurance companies against Southern policy holders, based upon an erroneous idea of our mortuary statistics, which was ordered published:

TUSCALOOSA, ALA., April 10, 1874.

Dr. P. Bryce, Supt. Ala. Insane Hospital:

MY DEAR SIR—I have a policy of insurance on my life in the Equitable Life Assurance Society of New York, and one in the Southern Mutual Life Insurance Company of Kentucky. The rates of insurance are the same. The *Southern* policy is one year older than the *Northern*. The Southern gives me a larger dividend all the time; and recently I have received from the Equitable my certificate of dividend, which is $3.96 instead of $16.03 for last year! The Company also furnished me a copy of circular explanatory, in which it is stated that the "mortality is so great" in the Southern States "that the dividend notices, for *Southern Class* policies, sent herewith for January (1874) show a reduction from the previous year." This is "*reduction*" with an extinguisher! But the Company affirms that "these dividends do full justice to our members who reside in these regions of the South." Now I do not want to think that the Equitable Society is trying to keep in favor of the Northern members during the financial pressure at the expense of its Southern members. But my dividend notice from the Southern of Kentucky shows no reduction for 1874, and I have seen some tables of comparative health (I do not know how reliable) that do not justify the action of the Equitable. In the Society's circular to agents there is given what might be called an isohygienic line. I enclose herewith a copy of the circular, to which I respectfully call your attention as an eminent Southern member of the Medical Professsion, capable of compre-

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hending the importance of the subject. If the conclusions of the Equitable are correct, no Southern life insurance company, whose business is mainly south of the line described by the Equitable, ought to be permitted to use the same tables of rates as are used in the Northern States. Yet they are doing precisely this, and the hundreds of thousands paid annually to them is paid to corporations that must necessarily fail in a few years, if the facts are as stated by the Equitable. As you are about to attend the meeting of the Alabama Medical Association, it occurs to me that this subject is of sufficient importance to justify you in bringing it to the notice of that body. It would seem eminently fitting that the Medical Profession should assume the guardianship of their section in all matters growing out of hygienic conditions or facts.

TABULAR STATEMENT.

		Am't of policy.	Dividend in 1872.	in 1873.	in 1874.
Same table of rates....	Equitable, N. Y..	$10 000	.....	$30 06	$ 7 92
	Southern, of Ky..	5 000	$50 45	30 40	31 85

I submit these hurried suggestions to your better judgment, and have the honor to be,

With great respect,

Your friend,

B. F. LARRABEE.

On motion of Dr. Cochran, in order to conform to the recommendation of the Committee, the resolution adopted on yesterday to print 500 circulars was reconsidered, and a resolution adopted to issue 1,000.

The special order was then called, and the two reports from Mobile were read.

Dr. Cochran proceeded first to read an able and elaborate essay on the "White Blood Corpuscle in health and disease," which may be found in its proper place.

Dr. Anderson then proceeded to read an instructive paper on neuropathology, especially illustrating the analgesic action of atropine on the pneumo-gastric nerve. This may be found in its proper place.

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The 8th order of business was now called, the election and installation of officers.

The President appointed Drs. Jackson and Bradfield tellers, and upon proceeding to elect by ballot, as required by the Constitution, the following officers were declared duly elected for the next year.

For President, Dr. J. S. Weatherly, of Montgomery.

For Vice-Presidents, Dr. J. J. Dement, of Huntsville, and Dr. R. D. Webb, of Livingston.

For Censor, for five years, Dr. Geo. E. Kumpe, of Leighton.

For Censor, for two years, Dr. N. D. Richardson, of Athens (in Dr. A. G. Mabry's place, deceased.)

For Orator, Dr. Thos. O. Summers, of Greensboro.

For Alternate Orator, Dr. W. A. Johnston, of Uniontown.

Place of meeting, Montgomery.

Time of meeting, second Tuesday in April.

On motion the following resolution was adopted:

Moved, That, until it is otherwise ordered, the Annual Sessions of the Association shall convene on the Second Tuesday of April of each year, and that the hour of calling the Association to order, on the first day, shall be promptly at twelve o'clock noon.

Drs. Ross, Michel and Anderson were appointed a committee to introduce the President elect.

Dr. Ketchum, on retiring from the chair, made a few earnest and feeling remarks, reiterating his appreciation of the high honor conferred upon him by the Association in calling him to preside, and testifying by his sentiments a strong devotion to the future good of the Association and to the profession. Turning to his successor he committed the charge to him with an earnest admonition to watch well its interests and guard carefully its dignity, honor and usefulness.

Dr. Weatherly, on assuming the chair, made a few well-

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timed and appropriate remarks, pledging his best endeavors for the good and future prosperity of the Association.

Dr. Bradfield offered the following

RESOLUTIONS OF THANKS.

WHEREAS, The State Medical Association appreciates the great benefit accruing from this, the largest and most interesting meeting of the Association since its reorganization;

Be it resolved, That the thanks of this Association be returned to the citizens of Selma for their kind entertainment and general hospitality.

To the officers of the following Railroads for a reduction of fare :

The South & North Alabama Railroad.

The Selma, Rome & Dalton Railroad.

The Mobile & Montgomery Railroad.

The Western Railroad Company of Alabama.

The Mobile & Ohio Railroad.

The Selma & Gulf Railroad.

The Montgomery & Eufaula Railroad.

The Alabama Central Railroad.

The Alabama & Chattanooga Railroad.

To the Young Men's Christian Association for their kindness in extending the use of their beautiful hall for our deliberations.

To the Stewards of the Methodist Church (Episcopal) for the use of their church for the delivery of the Annual Oration.

To the editor of the "Selma Times" for a liberal supply of the "Times" daily during our session.

To the officers of this Association for the able and faithful discharge of their varied and laborious duties during the past year.

To the Committee of Arrangements of the Selma Medical Society for their untiring efforts to make our stay in Selma comfortable and pleasant, and for the perfect and systematic order in which they have arranged everything for our reception and proceedings.

To the members of this Association who have labored and prepared such able articles on different subjects for the edification and future improvement of our profession.

To Messrs. Cawthon & Coleman, and Mr. G. L. McVoy, for their liberality in extending to this Association the free use of their beautiful and bountifully supplied soda fountains during our stay in Selma.

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Dr. Furniss offered the following resolution:

WHEREAS, It is highly desirable that the people should be instructed upon all subjects connected with the aims, objects and achievements of the Medical Profession; therefore,

Resolved, That this Association hereby express its gratification at the manner in which the Orator, Dr. S. D. Seelye, discharged the duty assigned to him, in pronouncing an address which was appropriate, interesting and instructive, not only to the Profession, but to a large number of citizens present on the occasion.

Adopted.

Dr. Weatherly offered the following:

Resolved, That a committee be appointed to prepare suitable resolutions in regard to the death of Dr. A. G. Mabry, of Selma, and that said resolutions, together with a copy of the eulogy of Dr. Bryce, be sent to the family of the deceased.

Adopted.

Dr. Gaston offered the following resolution:

Resolved, That the action of the House of Counsellors, limiting the eligibility of members when three Counsellors reside in a county, was an unwarranted exercise of power, although this Association recognizes purity of motive and a desire to advance the interest of the Association in said action.

After much animated, and at times even heated discussion on this resolution, participated in by Drs. Ketchum, Gaston, Cochran, Clark, Semple, Riggs and others, Dr. Ketchum offered the following as a substitute, which was adopted by the Association:

Resolved, That the House of Counsellors have the right to prescribe rules for their management in the transaction of business that may come before it, provided they do nothing contrary to the letter and spirit of the organic law of the Association.

Dr. Dement offered the following, which was adopted:

Resolved, That the Board of Censors be charged with the duty of obtaining a suitable seal for this Association, according to the requirements of the Constitution;

That they also be charged with obtaining in a proper style of typographical

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execution, a sufficient number of copies of the form of charter which has been adopted by the Association;

And that the result of their action in both cases be reported to the Association at their next annual session.

The following motion, by Dr. Dement, was also adopted:

Moved, That such County Societies as have failed for any reason, to send up the fee of one dollar for each member, will be allowed to conform to the provisions of the Constitution any time within two months after the adjournment of this session.

The President appointed the following committee on the death of Dr. Mabry:

C. D. Parke, M. D., Selma.

P. Bryce, M. D., Tuscaloosa.

T. C. Osborn, M. D., Greensboro.

The Medical Association of the State of Alabama now adjourned.

APPENDIX TO THE MINUTES.

REPORT OF THE COMMITTEE ON THE DEATH OF A. G. MABRY, M. D., SELMA.

Your committee on whom was imposed the duty of drafting suitable resolutions expressive of the grief of the Association at the loss of our associate member, Dr. Albert Gallatin Mabry, of Selma, a Counsellor of the Association, beg leave to submit the following report:

Resolved, That the Medical Association of the State of Alabama has lost one of its earliest and truest friends, whose manly voice was heard at its conception planning for its successful career, and rarely since then have his wise counsels failed to contribute to the dignity and effect of its annual sessions. The vacant chair now draped in mourning testifies to his absence from our midst for the first time in many years, and is it not appropriate to believe that his watchful spirit may now be in our presence guiding us to concord and harmony?

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He filled with distinguished ability the position of first President of the Association at its re-organization after the war, in 1868, and at the time of his death was one of its Board of Censors and a committee to report at your present session on "The History of the Medical Association and Medical Progress in Alabama."

His loss is one of no ordinary character; pure minded, gentle, considerate, cautious, temperate, cool in danger, forcible in debate, earnest in purpose, and unswerving in devotion to his duty, his life was a success, and nature united in him all the elements of the model christian physician; always a strict observer of the ethics of his profession, whether we contemplate his long and eventful career as a practicing physician, or his public record as a member of the State Legislature in its palmiest days, we find much to admire, and would point the younger members of the Profession to him and bid them emulate this model exemplar; detraction dares not point its blighting finger at any of his deeds.

Resolved, That a memorial page be left in the volume of Transactions to commemorate the loss of this great and good man.

Resolved, That we offer to his bereaved family our heartfelt sympathies, and assure them that the Profession of the whole State shares in their grief.

Resolved, That a copy of these resolutions be transmitted to the family of our brother, in some shape that may be preserved by them, and that they be furnished to the press for publication.

C. D. PARKE, Selma,
PETER BRYCE, Tuscaloosa,
T. C. OSBORN, Greensboro,
Committee.

Pending the adoption of the resolutions, Dr. Bryce, Counsellor from Tuscaloosa, addressed the Association as follows:

Mr. President and Gentlemen: Before these resolutions are adopted by the Association, I desire to endorse their contents more emphatically than by mere assent in the usual parliamentary manner.

It was my inestimable privilege to hold official relations with the deceased other than those which have brought us together to-day as a body of scientific men. He was a Trustee of the Alabama Insane Hospital, of which I have the honor to be the Medical Superintendent, and it is exclusively in this connection that I desire to commemorate a single phase, at least, of the valuable life and labors of our lamented brother.

It has been said that the most fitting monument in honor of a public man is a faithful record of his public acts. If these be worthy, and the record simple, Time, which destroys all things but good deeds and lofty thoughts,

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will embalm them for eternity. If they be base, eulogy adds a lie to their deformities and they must perish of their own corruption.

In the spirit of this truth, the Dallas County Medical Society, of which Dr. Mabry was a distinguished and honored member, has already undertaken his biography, and there remains for us little else than the expression of our individual grief and sympathy for his bereaved family and brethren of the Medical Profession. At the risk, however, of trenching upon the prerogatives of his regularly constituted biographers, I cannot refrain the mention, at least, of his valuable labors in that department of our specialty in which my own lot has been cast.

Whether impelled by taste and peculiar temperament, or whether the result of a mental conformation that opened up, in every avenue of life, enlightened and extended views and wide-reaching sympathies, he exhibited, far in advance of the Profession at large in the State, and perhaps of any individual member of it, a deep interest in the treatment and cure of insanity. He was the first to discover the necessity of an institution devoted exclusively to that purpose, and the first to propose and urge the measure upon his fellows of the County Medical Society. As their corresponding secretary, by his unflagging zeal, he communicated to other prominent members of the profession something of the enthusiasm, or rather the determined purpose, which prompted and sustained his efforts in this humane direction.

At the subsequent meeting of the State Medical Association, held in this city in the year 1850, he introduced and advocated his scheme, for the erection of a hospital for the exclusive care and treatment of the insane, with such characteristic clearness and force that there was not heard a dissenting voice in all the assembly. Under the auspices of the Association, legislative aid was invoked, in its behalf, through a commission composed of our best and most influential physicians. It is needless to say that in this, as in its inception, the invincible will and determined energy of Dr. Mabry bore a conspicuous part, and were instrumental, to a great extent, in securing the passage of the act of incorporation.

After the completion of the hospital buildings in 1859, he was among the first seven permanent Trustees appointed by the Governor, and, excepting a brief intermission, held that office until the day of his death. In the capacity of State Legislator, which office he frequently held while a Trustee of the hospital, his influence was always exerted in behalf of the institution; and at one time, just after the completion of the buildings, when from mismanagement of the funds appropriated for their erection, and other reasons, the project had

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fallen into disfavor and disrepute, his personal influence and popularity alone saved it from abandonment, and secured the appropriation necessary to complete the organization and prepare it for the reception of patients.

Such, in very brief, is an imperfect but truthful record of one of this great and good man's public acts, the first fruits of which he was happily spared to enjoy. In its consummation he signalized his greatness as a physician, a philanthropist, and a patriot, and erected to his own memory a monument which christianity and civilization, throughout the coming ages, will delight to perpetuate and to honor. The remembrance of his good deeds, long after the monumental marble which commemorates them shall have crumbled into dust, will continue to live in the hearts of the host of stricken ones whose darkened minds, suffering homes, broken hearts, blighted hopes, and blasted ambition he did so much to redeem on earth; while the glorified spirits of the departed, disenthralled by death from their tottering tenements of darkness and disease, will chant his praises before the throne of the Eternal One who has promised that a cup of cold water to one of his children shall not go unrewarded.

MINUTES OF THE SESSIONS

OF THE

HOUSE OF COUNSELLORS.

The first meeting of the House of Counsellors was held on Tuesday evening, the 14th April, at 6 o'clock.

After some informal discussion it was decided that the officers of the Association were ex-officio officers of the House of Counsellors.

Dr. Ketchum, on taking the chair as the first President of the House of Counsellors, made a graceful manifestation of

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his appreciation of this high honor, and paid a tribute to the dignity, zeal and intelligence of this House, and foresaw an auspicious future for the Association.

The first order of business was the revision of the roll of Counsellors.

Dr. J. M. Godfrey, of Sumterville, was added as a correction.

Dr. A. J. Reese, of Mobile, was added as a correction.

The residence of Dr. J. D. Johnston was corrected to Sumterville, not Livingston, as printed in the transactions for 1873.

Dr. Henry W. Bassett, of Huntsville, resigned on account of removal from the State.

Dr. Wyatt Hollingsworth, of Mobile, resigned on the same account.

Dr. G. A. Moses, of Mobile, resigned on the same account.

Dr. W. P. Reese, of Selma, resigned also.

Dr. A. G. Mabry, of Selma, was reported dead.

Dr. J. S. Bankson, of Stevenson, was added to the roll as accidentally omitted in the transactions of 1873.

There being no further alteration in the minutes the House now proceeded to the election of new members.

Dr. Cochran offered the following resolutions, which were adopted:

Resolved, 1, That at this session of the Association no Counsellor shall be elected from counties having already on the roll as many as three Counsellors.

2. That one Counsellor shall be elected from each county which has sent representatives to this session, and in which there are as yet no Counsellors at all, and that no other Counsellor shall be elected at this meeting.

Under this resolution the House proceeded to the election of the following members:

Dr. L. E. Starr, of Bibb county.

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Dr. A. D. Richardson, Athens, Limestone county.

Dr. B. W. Toole, Talladega.

Dr. Jas. Gillespie, of Henry county.

After which the House adjourned.

SECOND DAY.

The House met at 6 P. M., on Wednesday, the 15th April.

They then proceeded to elect new members under the order adopted yesterday.

Dr. C. H. Franklin was elected from Bullock county.

Dr. J. S. Ruffin was elected from Marengo county.

The following resolution was then introduced by Dr. Semple, of Montgomery, which was adopted:

Resolved, That hereafter, in the election of any additional members of the House of Counsellors, a due respect shall be paid to the recommendations of the County Societies, and that they be requested to send up to each succeeding meeting, in charge of their respective delegates, the names of such of their members as they may desire elected to the House of Counsellors.

Dr. Cochran offered the following resolution, which was also adopted:

Resolved, That the Secretary be instructed to give those persons who have been elected to the House of Counsellors formal notification of their selection, notifying them at the same time of the duties which are attached to the position of Counsellors. That all of them who give their consent to accept the position, with its duties and obligations, and make payment of the fee, shall be placed upon the roll of Counsellors. That in the case of such as have attended this session of the Association the delegates fee of five dollars shall be allowed as part payment of the Counsellor's fee.

There being no further business the House adjourned.

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PRESIDENT'S ADDRESS.

Gentlemen of the Medical Association of the State of Alabama:

The presidency of this Association is the proudest distinction that the medical profession of Alabama has in its power to bestow.

I feel that you have elected me to this position, not from any peculiar fitness for its varied duties that I might possess, but because, perhaps, you recognized and appreciated the earnest and hearty efforts that I have ever made to honor our noble profession, and the zeal with which I have always labored to advance its best interests in our beloved State. I am proud of the position, not alone for the honors with which it comes crowned from those who have preceded me in it, but because it gratifies that loyal ambition which I have ever had to win distinction in honest and zealous efforts to advance the high claims of the profession of Medicine.

"For there is a blameless love of Fame, springing from a desire of justice,
When a man hath fealty won and fairly claimed his honors;
And then Fame cometh as encouragement to the inward consciousness of merit,
Gladdening by the kindliness and thanks wherewithal his labors were rewarded."

It is a source of congratulation to see so many of the representative men of the medical profession from all parts of the State, assembled on this, the sixth anniversary of our reorganization, in this fair city, which so justly deserves to be styled the cradle of the Medical Association of the State of Alabama, and which, with such generous hospitality has opened its hearts and doors and bid us welcome.

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But, alas! one seat is vacant; and we look around in vain for that well-known and familiar face, that for so many annual recurrences of this occasion, was so sure to greet us with a smile of welcome.

The Medical Association of the State has lost one of its earliest originators, and one of the first promoters of its efforts —one of the most steadfast of its friends—one of the most honored of its fellows.

A. G. Mabry has done with the cares and burdens of this life; has gone beyond the reach of its pleasures and its honors; his name erased from the roll of this organization, will henceforth be found on that of the venerated dead, who have faithfully served the cause of their profession, and discharged their full duty to their State.

Individuals make the history of the communities in which they live; the medical history of Alabama and its State Association, would be incomplete, indeed, did not the name of A. G. Mabry adorn its brightest page.

His brain conceived this orgrnization; he was present at its birth; he stood sponsor for it in its helpless infancy; he succored it in its days of progress; and now, when in its approaching maturity he dies, he bequeathes to it the honors inseparably connected with his example and his name.

Whilst we drop a tear on his newly-made grave, let us rejoice and be proud that he so honored his profession in his life.

The presence of our honored ex-Presidents—R. F. Michel, F. A. Ross, T. E. Osborn and George E. Kumpe—lends additional grace, dignity and interest to this occasion. May many future annual meetings find them rejoicing at the prosperity and usefulness of this Association; shedding

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the lustre of their names upon its labors, and adding the wisdom of their councils to its deliberations.

Besides the cordial salutations of this hour; the warm and friendly greetings; the respite from the cares, anxieties and exacting duties of our every-day life, and the social pleasures that our meetings afford—I trust we come prepared to grapple with the great questions of medical science, which concern so nearly all the material, moral and social interests of our beloved State, with that noble, lofty and aspiring earnestness, proportioned to the importance of the subject, which should characterize minds living to fulfill a great and useful destiny, yet tempered with the spirit of kindness, forbearance and brotherhood.

Prof. Huxley, in one of his lay sermons and addresses, writes as follows: "Merchants occasionally go through a wholesome, though troublesome and not always satisfactory process, which they term taking stock. After all the excitement of speculation, the pleasure of gain, and the pain of the loss, the trader makes up his mind to face facts, and to learn the exact quantity and quality of his solid and reliable possessions. The man of science does well sometimes to imitate this procedure, and forgetting for the time, the importance of his own small winnings, to re-examine the common stock in trade, so that he may be sure how far the stock of bullion in the cellar, on the faith of whose existence so much paper has been circulating, is really the solid gold of truth."

And now, on the threshold of another session, when for the first time we come together under new terms of copartnership and agreement, as it were; with a new constitution to perfect our organization and direct our progress, it were well for us to pause and follow the merchant's rule, and take an

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account of stock, and lay our plans for future enterprises and successes.

As monuments of the zeal, energy and high purposes of the Association in its original ante-bellum organization, we may point with pride to the Insane Asylum at Tuscaloosa, and the Medical College of Alabama at Mobile, both to a certain extent the offspring of this Association. We can now point to a long list of members among the most honored and distinguished of the State; volumes of Transactions, that have been filled with well written papers and instructive suggestions, and that have commanded the attention of the profession both at home and abroad. We have cause to congratulate ourselves, that our meetings have been so largely attended and have effected so much good for the profession throughout the State, organizing it into a working body, as it were; County Medical Societies have been formed, and a feeling of interest aroused in the profession generally, which is promising of good results in the future. These constitute some of the capital left from the past of our labors. Now, as enterprising merchants would, let us see if we have exhausted our field of labor; let us question if there are not new avenues for enterprise—new schemes inviting investments—if there is not a larger scope for energetic and industrious investigations. Have we exhausted the material from which rich returns may be expected from well directed efforts?

Whilst we have cause to congratulate ourselves upon what has been accomplished, and recognize the benefits conferred upon the profession of the State, and treasure up the practical facts and the important truths which we have added to our ready capital for use in our daily vocation, let this not satisfy us as to the sum total of good to be derived by ourselves, or to be bestowed upon our State by our meetings.

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But let us now be inspired by a still more public-spirited policy; a new ambition, more loyal to higher duties, more studious of the highest questions of our calling; the consideration of those, equal to the loftiest impulses of the philanthropic soul, the most active intelligence of the well-trained intellect, and the most abounding knowledge of a united profession. I mean, gentlemen, *the sanitary needs of the people of our State, and the related obligations of the medical profession.*

The practice of medicine only ceases to be an empirical art founded on imperfect knowledge and metaphysical reasoning, as these are replaced by scientific deductions founded upon physiological conditions and pathological evidences. The restoration to healthy function of the organs and tissues of the human economy, from the pathological changes presented to the medical investigator, are dependent more and more continually on scientific and philosophical inquiry, based upon physical and chemical causations. It is in the progress made in anatomical, physiological, therapeutical and pathological investigation, that the profession has been enabled to vitalize medicine as a *science* for the general good of mankind.

But it is not alone in these departments that medicine, in the last quarter of a century, is fast making that an exact science, which, previously for the most part, was an empirical art. A new science is now dawning upon the physical destiny of man. Its rays are penetrating the darkest recesses, and revealing the hidden forces, which, with such irresistible energy, have hitherto devastated the race.

It is revealing also the stupendous fact that disease is an anomaly; that it is largely, and perhaps always, caused by agencies which man can remove or destroy. Nay, more; it is demonstrating that the most destructive diseases are generally of man's own direct creation, and entirely subject to his

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will. It is by the scientific and practical deductions from has these premises, that the department of *preventive medicine* sprung into existence, and that the laws of hygiene are evoked with the view of promoting the general good and welfare of the State by diminishing sickness and decreasing the death-rate of its population.

Public hygiene, as a department of study and labor, has made within the past three years, extraordinary progress—progress commensurate with its importance. In England and in some of the communities of our more highly favored Northern States, it has advanced from a code of empirical rules, based upon imperfect observations, and the assumptions of speculative philosophies, to the dignity and proportions of a distinct science, based upon the deductions of modern physiology, pathology, and chemistry, and occupying the time, talent and industry of the best informed and most philanthropic men in and out of the medical profession. With the establishment of public hygiene upon a scientific basis, there has been a remarkable and general awakening of the public attention throughout the civilized world to the value and necessity of sanitary government. The medical mind is fast realizing the vast importance and growing interest of this subject; communities and cities are earnest in their efforts to secure to themselves the peculiar advantages of sanitary laws, and well-directed hygiene measures. With this growing belief, that many, if not most, of the diseases, which afflicts mankind are of his own creation, and may be prevented; that endemics depend upon local conditions, which may be removed; and that the most violent and destructive epidemics may be controlled and "stamped out," Governments are recognizing the vast importance of this department of science; Legislatures are enacting laws relative to the public health,

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and Boards of Health, organized on principles that give them efficiency, are rapidly multiplying in the States and municipalities in all parts of our country. Bureaux of statistics and registration are receiving a proportionate share of this general attention.

At the annual meeting held in San Francisco in 1871, the American Medical Association, recognizing the importance of this new department of science;

Resolved, "That this Association recommends a distinct and separate chair of hygiene, independent of physiology, to be established in all our Medical Colleges, and constituted a requisite curricular preliminary to that diploma which confers one of the highest honors of the profession."

The Medical Association of the State of Alabama, at its session in Huntsville, 1872, approved and adopted a plan for the organization of a State Board of Health.

Last season the Faculty of the Medical College of Alabama, ever anxious and eager to graft upon their course of instruction, all that will advance the interests of medical science in this State; eager to place medicine and medical men in that advanced position in public estimation and honor to which all their meritorious acts entitle them; and recognizing that it was indeed a most important part of the science of medicine, created a chair of Hygiene and Sanitary Science, and they are proud to record the fact that the course of lectures delivered during the session just ended, is the first course in this department, delivered to any medical class in the South.

Within the last few days, referring to the published report of the Board of Health of New Orleans, I see the following recommendation:

"The establishment and endowment of a Professorship of

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Hygiene in the University of Louisiana, to be independant of, and in addition to, that of Physiology."

"This action will secure to the young men of the medical profession proper knowledge of the subject as understood at the date of their studies, and a proper appreciation of preventive, as contrasted with curative medicine; each physician will be to the community in which he practices his profession a source of information—a director of public sentiment and an efficient supporter of all organizations and measures calculated to improve the public health and prevent disease."

A committee of both houses of the National Congress is now preparing a bill having for its object the establishment, on a practical basis, of a system of National Quarantine.

Now, gentlemen, whilst these and many other evidences are afforded, that the merits and claims of this comparatively new science are being recognized; whilst the profession is being aroused to its vast importance, let us not be laggards in this onward movement; let us not rest satisfied with the feeble efforts that we have made. But rather let us regard it as a sacred duty and high privilege to take up this subject more in earnest and make it the occasion of vigorous, well directed, and persistent action.

The demand is made on us to pursue this course:

1st. As members of a scientific body, having for its main object the investigation of the causes of disease, with a view to the preservation of life, and protection against disease.

2d. As humanitarians and philanthropists, who love their fellow men, and would deserve the appellation of benefactors.

3d. As true patriots, who would preserve those jewels of the State, the health and life of its people, and thereby give value to the material interests and prosperity of the country.

First, then, as members of an organization devoted to

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science and the preservation of life and protection against disease, we must, as a part of our creed, believe:

That the conditions of perfect health, either public or personal, are seldom or never attained, though attainable; that the average length of human life may be very much extended, and its physical power greatly augmented; that in every year in this State thousands of lives are lost that might have been saved; that tens of thousands of cases of sickness occur, which might have been prevented; that a vast amount of unnecessarily impaired health and physical debility exists among those not actually confined by sickness; that these preventable evils require an enormous expenditure and loss of money, and impose on the people unnumbered and immeasurable calamities, pecuniary, social, physical, mental and moral, which might be avoided; that means exist within our reach for their mitigation or removal; and that measures for prevention will effect infinitely more than remedies for the cure of disease.

Is the belief in these propositions well founded? Do the facts of sanitary literature give confirmation to it, and legitimate arguments to sustain it?

I think they do—and if they do, then what subject can come up for our consideration that transcends it in importance? Without life nothing is valuable; without health that gives zest to enjoyment, nothing makes that life valuable or develops it into its full measure of usefulness.

How much more valuable then the means to possess and enjoy both life and health, which alone gives value and usefulness to other objects!

When compared together all other matters, this side the grave, are as the Dead Sea fruit, but ashes on the lips!

This great matter of the public health concerns, in an

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especial manner, the medical profession. It is for them to recognize its vast importance, that it may be correctly surveyed, that its elements may be accurately analyzed, and that its remedies may be practically applied. The profession will learn the useful lessons taught by a better knowledge of the causes of disease and its true nature; and these lessons applied to their legitimate end, will be even more valuable to the whole people, for they will teach them how to prevent disease, and to live without being sick. Money value cannot estimate blessings like these; and how unworthy would it be in a profession, whose keen and intelligent vision can see arrows of disease, invisible to other's eyes, watch their havoc and know whence they come and how they may be stayed, to withhold the means, which their enlightened position and superior knowledge have placed within their control, to prevent disease and protect the public health.

"Here, then, is the work for this Association; to educate the people in respect to the nature and causation of diseases, and the means for their prevention; to suggest appropriate legislation for compelling, when necessary, the use of those means, and to present arguments for such education and legislation, fortified and made cogent by *facts, well authenticated*—cases of disease and death directly traceable to ignorance, neglect, or disobedience of the laws of hygiene; and to make it possible, by this work, that many of the lives and much of the treasure, now needlessly lost to the State, may be saved."

Let the noble army of medical men, who are day by day engaged in a hand to hand fight with our great enemy, disease, enter, with equal earnestness, upon the new line of duty of investigating and pointing out the influence of the topography, geology, and climate of various parts of the State, upon

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the health of its citizens; the importance and intimate relation of drainage and sewerage to the health of families and whole communities; the influence of various kinds of occupations, food, drink and clothing, as well as the structure of public and private buildings upon the development of certain forms of disease; and most especially to point out the vast importance to the welfare and perpetuity of the State of properly rearing, training and educating the young; and to point out the nature and causes of epidemics, endemics and contageous diseases, and the means for their prevention or eradication.

Let them, in this peaceful role, "call forth and so marshal facts and generalize the scattered forces of knowledge as to lead to a victory over any of the prominent causes of death which now annually destroy our citizens by hundreds, and humanity may well accord them a higher praise than to the most successful of warlike armies."

Let the medical men but be active and earnest in this comparatively new movement in this State, and soon it will enlist the hearty co-operation and assistance of the intelligent of all classes, and all professions.

In the great objects which sanitary science proposes to itself, in the immense amelioration which it proffers to the physical, social, and incidentally to the moral and intellectual condition of a large majority of our fellow creatures, it transcends in importance all other sciences, and the true and intelligent people themselves will soon be taught by its beneficient operations that it not only develops the full scope of the true and humane purposes and destiny of the medical profession, but that it embodies the spirit and fulfills the intentions of practical christianity itself.

2d. It has ever been claimed for the profession of medicine that it was a humane science, and that its professors were

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true philanthropists; would we maintain that claim, and shout it from the hill tops in voices of thunder, and ring changes on it on the market places, that all the people might recognize the validity of the assertion and vindicate the justice of the claim, then, here in the fruitful field of sanitary science, let our workers go forth and reap the reward of well directed and intelligent labor. The investigators in other departments of science, encouraged by the plaudits of nations, and strengthened by the unsparing expenditure from the public treasury, have consumed time, lives, and untold treasure in the search for the open sea of the North pole; have written folios upon the habits and history of *insect life*; have employed the printing presses for days and months on the pages devoted to the *Invertibrata*; have searched the caves of the deep ocean for their curious denizens and varied fish; the forest glades for their crawling and poisonous serpents, and even the blue ether for its winged inhabitants; have even gone beyond animate nature and illustrated in their thousand varying tints and colors the trees and shrubs and grasses of the forests and the plain. What is our work in comparison with theirs? Do they not all sink immeasurably in the contrast? Their's the dream of the enthusiast, the speculations of the scientist, the fancy of the artist. Ours, to solve the great problem of life and investigate the mysterious wonders of the master piece of the great creative architect!

It is of man that we would write our folios—of his increase in physical power, the perfection of his intellectual greatness, the improvement in his social, moral, and personal happiness, that we would illustrate our editions. We would recognize the deadly enemies to his peace, his comfort, and, indeed, to his very existence; and, from the knowledge thus acquired,

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would erect barriers against their approach, and save him harmless from their attacks.

Gentlemen of the Association, do not join the hosts of ignorant men, who would sneer at these pretensions of Sanitary Science; do not be of the weak and timorous, who would hesitate to commit themselves to its principles, so large in their application; nor sympathise with that selfish and indolent class, who would shrink from the labor of change which their full recognition would entail; nor yet of that irresponsible body, who, careless of the duties that their position imposes, would still fold their arms in apathetic indifference, whilst others bore the heat and burden of the day. But appreciating the vastness of the undertaking; forming a just estimate of the magnitude of the work; weighing well the inestimable blessings that must flow from its successful prosecution, under an enlightened view of all the resources of sanitary science, determine that this much needed work shall be begun, that this cry of the suffering that comes up from all portions of our beautiful State shall arouse the humane and philanthropic spirit of our profession to earnest efforts in this most honorable and glorious department of our science.

It is, in truth, a colossal work; there is indeed labor in it; difficulties environ it; obstacles to its successful prosecution arise on every hand. But such labor has been undertaken; such work has been accomplished; such difficulties have been surmounted by determined efforts, and such obstacles have yielded to persistent and organized combinations against them.

"It is but a few years since the few meteorological observers, scattered about the country, supposed themselves to be simply recording the facts of meteorology in the general in-

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terest of unapplied science. Now it is claimed that the warning given by the U. S. Signal Bureau has, in several single instances, prevented probable loss of property to the amount of more than the cost of the Bureau since its existence, saying nothing of the probable saving of human lives. It is not improbable that this same knowledge of meteorological conditions will ultimately be instrumental in saving life in a different direction, by being connected with other knowledge relating to diseases prevalent at particular seasons of the year. And what is true of accurate observation and record of facts on meteorology is undoubtedly true of accurate observation and record of facts in any branch of sanitary science; if the work is faithfully begun, and earnestly continued, each new contribution to the stock of sanitary knowledge will repay the effort made by rendering the life and health of each individual more secure from the preventable causes of disease and death."

Let us dismiss these idle fears of failure, and in view of the vastness and greatness of the work, fortify ourselves the more strongly and securely with the necessary prerequisites to success.

The mind of man should no longer contemplate in despair the idea of the *impossible.* Nothing, said Mirabeau, is impossible to the person who can will, "Is that necessary? That shall be." This is the only law of success.

The progressive spirit of the age, in its grand achievements in all the departments of the arts and sciences, has carried man into what, a few years ago, would have been deemed the very realm of the impossible. His creative genius, aided and stimulated by suggestive thoughts which accompany each day's new revelations in the finished work of the hour, leads him ever into new and untried paths of discovery. Wonder-

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ful deductions of to-day, at first faint and indistinct under the shadows of the impossible, are drawn from the finished work of yesterday, to be the fixed facts of a miraculous revelation of to-morrow.

In the fifteenth century, in Genoa, a child was born, whose destiny it was to search over the trackless ocean for a new world. After weeks and months of weary watching, his eyes at length beheld what had often been pictured in his dreams —a new land, and a new people. This was the first link that was forged in the chain which was to unite these widely separated hemispheres. The breath of Heaven had been utilized for this first effort.

Years passed on, and man suborned another element to bear witness of his power, and to work out his grand designs. Taking the water from old ocean's bosom, he made it the slave of his will and drove his mighty steamships through her surging billows, and drew the hemispheres almost into each other's embrace. A few more years, and looking from the ship's side into the depths of this great ocean, and we find, two miles beneath its foaming surface, a coil of wires stretching from the old to the new world—wires not inert, but transmitting through their great length an invisible agent, the slave and messenger of man, with a velocity of which lightning is the fit expression, since lightning itself is the messenger. Thus was forged the last link in the chain that was begun away back in the fifteenth century.

Man fashioned the growth of forests, and the minerals of the earth to suit his purposes and perfect his triumph. He proclaimed his dominion over the winds of Heaven, and bade them waft him on his course. He laid his hand upon old ocean's threatening crest, and with the power of that new *genius* of his creation—steam—plowed through her opposing

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tides. And then, as if in very derision of the *impossible*, he bid the most powerful and mysterious of the forces in the universe around him be his slave and messenger; time and distance were annihilated, and the old and the new worlds were in each other's embrace! With this record of man's achievements in view, let us no longer be disheartened by that foe to determined enterprise, "the impossible."

In all departments of research, old things and old theories are giving place to new and startling developments, under the magic touch of science with its improved aids to investigations. See what a flood of light has been poured upon the hidden and mysterious secrets of Nature by the spectroscope, bringing us revelations even from those "wheeling globes" that circle through the realms of space, and make up the harmony of the vast and infinite universe.

See how the vague and uncertain details of the physiologist and pathologist of a few years since fade out of view before the new revelations of the compound and more powerful microscope in the hands of investigators and hystologists of the present hour! And as we stand amazed in this new light, let us not despair of searching with equal success into the hidden causes of disease, and the means of rendering them inoperative, or less powerful for evil. Though the science of hygiene has been, as it were, groping in the dark, yet wonderful results have followed quickly upon its efforts.

We are taught by the results of these efforts that towns may be made almost as healthy as the rural districts; that in many cases fifty per cent. of the deaths that occur are due to causes which may be removed.

From its statistics, it is estimated that for every death prevented, about twenty-seven cases of disease are prevented,

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and that the per centage of deaths has been reduced from forty to twenty.

That in the leading towns and cities of England, including London, the results of sanitary measures have been a reduction in the death rate from twenty-eight or thirty in the one thousand, to twenty-two, and even fifteen per one thousand. In Liverpool the rate of mortality was 38.4 in 1,000 before the sanitary changes were made in the streets, cellars and dwellings, and 26 in 1,000 afterwards.

In the notoriously unhealthy parish of St. Giles in London, every street and court has been brought under control, and the death rate has decreased from fifty in the thousand to less than fifteen in the thousand, annually. The same facts are established in Liverpool, Glasgow, Manchester, and Salisbury, the "sick city healed," in which the mean rate of mortality was, by sanitary improvements alone, in ten years reduced from twenty-eight deaths in the thousand to fifteen in the thousand.

The mortality among children in American cities is frightful; one-third die in the first year, and one-half before they have attained their fifth year. What has been said of the preventable diseases of the race, applies with equal force to the causes of diseases among children.

The State has an important interest, in an economic point of view, in all who are born in its limits. Of those, the number dying before reaching maturity are a direct loss to its producing capacity; those who reach maturity then labor and contribute to the common strength and wealth, for we may in this view regard man as a productive machine, which creates property and sustenance for itself and the State. The child that is born is but a vital machine begun; it is powerless and ineffective until, as it were, it is built up, developed—mature

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and trained for work—and during this period, this process of development is perfected by the expenditure which is abstracted from the resources of the State. This process is a perilous one, and many fall by the wayside. The blessings which these perishing children were to their families can not be measured or told in language. The heart alone knows the joy of their appearing, and the anguish and sorrow of their loss; but the State knows them as the bright *promises* of usefulness which were not and never can be fulfilled. With facts like these before us—and they might be multiplied indefinitely—it is criminal to sit down and fold our hands, when such destructive evils are abroad in the land; when, by united effort, we might stay or greatly mitigate their progress.

There are yet other relations in which the claims of sanitary science impose obligations upon us, to-wit: as citizens of the State, lovers of our country and homes, and as true patriots.

The health of the people is the nation's wealth. It is its safety, too; for the fate of a nation will ultimately depend upon the health and strength of the population. A watchful care over the health of the people, and a due regulation of matters which concern them in this connection, are certainly amongst the most important functions of government.

The government and the people must go hand in hand, mind with mind, heart with heart, under the full conviction that a chief and great interest of the State lies in this great agency of human power—the health of the people. Herein is all its strength; this creates and manages all its wealth, and it is a weighty responsibility of the government to protect it, to enlarge it, and make it more and more productive.

In the creation of wealth and power, man and nature are co-partners. Nature contributes the material, and man gives

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it value, by so manipulating and forming it as to make it available. Nature furnishes the crude and worthless ore, and the cunning hand of man so fashions it, through the various processes of the shop and factory, that it gathers value in a hundred, a thousand and ten thousand fold. And it is in this view that the State has an interest, not only in its fertile lands and its mines of metals, but in the health, the strength, and the effective power of each member of its communities. It has a claim upon all to develop their estates and themselves, bodily and mentally, so that each can add to the aggregate wealth and power of the whole; and they in turn have a claim on the State to use its power and its wealth to insure them the necessary health and freedom from disease and death-producing causes, so as to enable them to satisfy the State's claim.

Thus, all additions to the physical, moral or intellectual power of individuals—all strengthening of the arm, all increased skillfulness of the hand, all culture of the brain, sharpening of the perceptive faculties, or discipline of the reflective and reasoning powers, in any individual, are, to that extent, additions to the energy and the productive force, the effectiveness and the wisdom of the State; and, on the contrary, all deductions from these forces, whether of mind or body—every sickness, every injury or disability, every impairment of energy, mental or physical—abstract so much from the force, the power and the safe administration of the body politic. The application of statistics to public health has given an impetus to the subject of hygiene generally, and State medicine in particular; for it is impossible in an enlightened age for any State or any government to remain indifferent, when, in figures which admit of no denial, the natural amount of health and happiness or disease and suffering is determined. The daily experience of the practicing physi-

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cian, in town or country, shows to him the utter want of sanitary knowledge in the people at large, and the absolute blindness to the simplest principles of sanitary science on the part of the authorities immediately concerned in the people's welfare. If these be facts, and the destiny of a State so largely depends on its condition of health, and the ignorance in sanitary matters of those in authority and of the people at large is so lamentably great,—how loudly do these facts proclaim the duty of the medical profession! By every consideration of patriotic duty are they urged to take the initiative in this most important matter. They must inform themselves, they must enlighten and educate the public mind, and they must bring prominently before the attention of the State, county and town authorities what so nearly concerns the welfare and best interests of our land and people.

The ascertained results of the value of sanitary laws and scientific hygiene, must arrest the attention of statesmen and legislators; for upon the observance of these laws depend national wealth, power and greatness; and upon their neglect, national decay and ruin.

All suffer from the neglected causes of disease; but the poor pay the heaviest penalty. Their health is their only capital, and the whole of it is often sunk in their contest with disease; hence pauperism is increased; increased tax upon all to sustain the charities for the destitute sick; industry and its fruits lost to the general good; and neglect of moral improvement, and cultivation of the intellect, entailed upon their unfortunate offspring.

"Thus everything conspires to make hygienic measures the great question of the age; enlightened self-interest, the good of mankind, economic considerations, public and private, the wealth and power of the State, and religious obligations

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unite to urge this knowledge and observance upon every member of the community." To achieve success, the efforts of the medical profession must be supplemented by the influential citizen; for by the power of such co-operation ignorance and selfishness can be compelled to cease their opposition.

The medical men of Alabama are urged in an especial manner, in consideration of her present condition to take broad and enlightened views of this question, to move actively and persistently in this matter, and to proclaim in language that will arouse the attention of all, the paramount importance of this movement that holds out such promise of good for the future.

It might almost be affirmed that the future of this great State was in the keeping of her medical profession, or in this Association as their representative body.

The first inquiry that is usually made by one who thinks of settling, visiting or trading with a country, is in relation to its health. Alabama, with the other Southern States of this Union, has been cursed with the reputation of being notoriously unhealthy; with having a climate that debarred all others save the negro race, from cultivating her rich and inexhaustible lands; and thus the tide of emigration has been turned away from a State whose every variety of climate, soil and production invites the labor of the world. It is for the medical profession of the State to prove that where sickness does prevail, it is due to removable causes, and to see to it that preventive measures of an approved character be at once undertaken; and it is their duty, too, to show, by registration and vital statistics, when these removable causes of sickness do not exert a hurtful influence, that the death-rate is not in excess. The registrar of vital statistics should always be of the

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medical profession; each county should have its record, and the State Board should be the depository and custodian of these reports, so as at once to secure accurate records, their careful peservation, their scientific analysis, and the proper use of all the facts—for the study of vital statistics is to public hygiene what the study of anatomy is to practical medicine—it is the foundation of the science; and these facts accumulated, can only be valuable, interesting and fruitful of conclusions in the degree that they are duly recorded, faithfully preserved, scientifically analyzed, and acted upon and published.

With the population of our State diminishing; with the mortality from zymotic diseases increasing; with the impoverishment of every portion of the State, visible even to the casual observer, it behooves us in an especial manner to prove to the world that this State, the teeming mother of the richest agricultural products, illimitable mines of coal and iron, of deposits of lime, of quarries of stone; possessed of the grandest forests of timber, of endless water power, of pasturage, and of all the natural elements of a nation's wealth and power, need not be classed as lacking that great essential—health. Patriotism and State pride call aloud to us, gentlemen, to look to the vast importance of this matter, and to begin at once our part of the work of our State's redemption. The first step must be accurate information for ourselves. There can be no advancement without we are first made acquainted with our actual condition. The discovery of an evil must always precede its removal; and there is an evil, close our eyes to it as we may, it does exist, drawing year by year compound interest from our neglect. The importance of a knowledge of the health of a community, is only second to the health itself. Our amount of knowledge of the health of our State from reliable sources, is exceedingly small.

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What we want is the actual truth based on statistical facts, from all parts of the State, yearly—the figures of everything which it concerns a people to know. Suppose, like Massachusetts, our own State had obtained the actual truth, yearly, not only of her sanitary condition, but of births, marriages, manufactures, agriculture, and all those things which go to make up vital and material statistics, so that her advancing, retrograde and relative condition could always be known—of what immense importance it would have been to us—what a healthy stimulus to the body politic it would have proven. A State that is ignorant of its condition—of a prosperous or adverse state of affairs, of what may advance the one or remedy the state of the other,—may be actually retrograding while it is supposed to be thriving, and may be suffering while in reach of all the gifts of fortune. In fact, the limit to the advantages of a people becoming acquainted with their condition, is as boundless as the wants of man, for thus only can it be improved.

Had we been possessed of this enlightened knowledge of our true condition, our resources, our wants, and our capacity, we should not, then, have seen the finest advantages of health and wealth that the God of Nature offers to the industry of man, hidden from the public view for want of exposure and development.

Nor would we have seen our young men, and our old men, and our labor scattering to the ends of the earth in search of what could so readily be found so near our own doors. They go to seek money, forgetful of the fact that money is but one of the elements of true wealth, forgetful of the facts that home comfort, with its improvements and conveniences, old associations with their social pleasures, good schools, and

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good health, are important factors in making up the estimate of tangible and enduring wealth.

Politically, socially and financially, there is no hope for our dear old State but to place her before the world in a sanitary point of view that will invite immigration to her borders. Now is the time, when, under the operation of a destiny more powerful than man's efforts to oppose, the black labor of the State, robbed of the protection and support that it had before the decree of war left it to its own resources, must be thrown off from the body politic, as the effete and unorganizable material of the human body is thrown off as unfit for its nutrition. Now is the time to take the the initiative in the effort to supply new and more productive material. Delay but sinks our State deeper and deeper in the abyss of social degradation and financial ruin. It is a fact pregnant with thoughtful attention, and illustrating how greatly our future is involved in its due consideration, that life insurance companies are actually withdrawing their agents and declining to take risks in portions of our State on account of what they suppose to be the excessive mortality from zymotic diseases. Can we, under such circumstances, hope to induce immigration, with all its vivifying influences, to turn its tide towards our limits? No, as a condition precedent we must supply the facts, not rest satisfied with the damaging hypothesis based on ignorant assumptions, which, as yet, we have taken no reliable steps to disprove.

How much has our State lost, and is losing in every element of prosperity, from want of suitable knowledge of her true condition and her capacity! With all her advantages, and scourged only by preventable diseases to any extent, still she constantly sees States less favorably situated and

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circumstanced far outstripping her in the development of wealth, power and prosperity.

It is a sacred duty we owe ourselves and our State as good citizens, to exhibit the true sanitary condition of our country, to remove the bugbear in relation to the effects of our climate upon health, to give the actual facts of the ratio of deaths to the population, the average of deaths, the general character of sickness, of the relative sanitary condition of every portion of the State; these and many other items that would go towards making up an enlightened knowledge of our State's true condition and capacity.

Her advantages and her wants can only be estimated in a shape to be of practical utility by a proper registration law, and a well appointed system of vital statistics. Who can doubt but that these would establish her claim to the possession of general salubrity, genial climate, rich agricultural lands and incalculable sources of wealth and prosperity, that she could offer to the enterprising and industrious of less favored portions of the world. Her true sanitary condition and her immense advantages would invite the capitalist and the emigrant to add their stores and strength to ours, and with united industry make her fair fields and her teeming valleys the very garden of the South.

Is not this a matter of such vast importance, of such vital interest to the present and future of our homes and our State, and so worthy of the first and highest consideration of our profession, that we should call upon the intellect, the energy, and the united efforts of this association of the medical men of the State, to give heed to it in earnest, and inaugurate at once a well directed plan of sanitary and hygienic improvement.

You may ask how such a plan can be executed, and what

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suggestions have I to offer in furtherance of it? The limits assigned to this address will not permit me, of course, to answer these questions in all the details necessary to develop such a system. I will say, however, that this Association must be the starting point of such an effort. It must be our self-imposed duty to originate such a scheme. We must, with proper zeal and unflagging energy, bring to bear the powerful influence of our organization and develop the full working power of the machinery of this Association, to prepare the profession throughout the State to give us their individual and united efforts to second our movement.

Those who have thus far withheld from us their aid and assistance must be won over to the cause. We must educate the public mind to grasp the importance of this subject, that it may realize how deeply the welfare of every individual and every community within the borders of the State is involved in this matter. This influence must be made to reach all those having official positions; the Executive, the Legislators, the county officials and municipal officers, even those aspiring to such distinctions, must all be made to feel that, through the thinking people, in this matter we wield a power and an influence which must not be ignored. We must be progressive; it is a law of our nature; it is forced upon us by the progressive movements in all the arts and sciences, by the daily observation of our wants and needs. We must act ourselves, nor idly wait upon the successful efforts of others. Great moral, political and scientific changes in the aggregate depend upon the amount of knowledge possessed by the ablest men, upon the direction that knowledge takes, and above all, the extent to which that knowledge is diffused, and the freedom with which it pervades all classes of society.

The efforts towards truth, useful, practical truth, made by

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great men are never lost, though for a time, perhaps, their full influence and power may be obscured. They are like truth itself, immortal; they contain those eternal elements which survive the shocks which bury in oblivion the theories founded on mere perishable material. They outlive the struggles of rival creeds, and witness on their glorious resurrection the decay of the puny efforts that for a time opposed them. It is to such that we owe all that we now have of substantial progress. It is such that are for all ages, and all times; "never young and never old, they bear the seed of their own life; they flow on in a perennial and undying stream; they are essentially cumulative, and giving birth to the addition which they subsequently receive, they influence the most distant posterity.

Let this Association make the first effort; let it be the grand centre. Let our county societies be the active machinery for collecting and preparing the pabulum for its efficient nutrition. Let their appointed committees be the hands constantly at work, gathering in knowledge of the health questions affecting their neighboring population. Let their individual members be the eyes, and the ears, that observe the important facts, and hear the slightest note of warning that tells of those secret enemies of our prosperity and our lives which carry in their train disease and death. Do this, and soon every rural district and hamlet, town and city will be brought under the life-saving operation of adequate sanitary legislation. Do this, and our profession will earn a new and enduring title to the respect and gratitude of the enlightened citizens of our beautiful State. Until this work is done, our labors are unfinished; we can not, we must not be satisfied with what we have done, nor with what we are doing; content would lead to apathy; out of disatisfaction would come constant improve-

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ment. All active progress must grow out of dissatisfaction at present improvement.

"Had not Louis been discontented with what Brousais called 'medical science,' we should not now be enjoying the rich fruits of Louis' philosophical methods. If Bright and his co-laborers had been satisfied with the confused and unsafe tenets of what was called 'renal pathology,' the profession and the world would not yet have been enriched with a contribution which is justly esteemed among the inestimable blessings bestowed by medical science."

I might enlarge on this branch of my subject almost indefinitely, did not a due sense of the value of time at our meetings warn me to desist. I have left much unsaid that I might have added to give force to my argument; I have omitted practical details, because they can be more satisfactorily suggested hereafter by those who may be appointed to this special duty.

My object has been to awaken a new zeal on this subject, to arouse a feeling of appreciation of its importance, that practical results might follow from the united efforts of our organization. The time for inaction has gone by; the time when self-styled conservatism in medicine can afford to smile incredulously at progress, has lapsed. The time has come when the profession of a State that will not go forward, must be run over and surpassed by those more zealous and active. Progress is the watchword of our age, as it has been of every age that promised good for the future. Nothing in our world can be stationary—

> "All life is ceaseless motion—to stand still
> Is but a term for death; the monument
> And not the living man."

The past, in medicine, has had its eternal monuments marking the pathway it has taken out of the delusions and super-

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stitions of the dark ages. Its future travails with great things; science is to win new triumphs, and to erect new temple monuments; new forces are to be applied; new remedies to be discovered; nature is to be more severely challenged, until she yields to the searching scrutiny of science, her undiscovered secrets. The domain of human knowledge is yet to be extended, and before the penetrating researches of investigators and scientists the darkness that has so long overshadowed the spirit of progress must be dissipated. Let us be toilers in this progressive movement, and give to it some portion of our earnest efforts. Science weighs everything in the balances of right and truth; she lays aside her stateliness and stoops to receive the mite from the humblest of her votaries, and applies it to the practical benefits of mankind. The loud and earnest cry of Bacon, when he asked, "Is knowledge ever barren?" is being answered far and near, among the high and low, in the medical profession and out of it. And in the department of sanitary science, the answer comes up from the whole civilized world, in voice so earnest, so loud, and so prolonged that its tones awaken attention on every side. She is young among her sister sciences, but she arises conscious of her strength, though yet in her youth; she has assumed as her lofty purpose to create a new era in the history of medicine; a new era in the knowledge and assertion of progress in the means of preventing suffering and disease, and prolonging life; a new era in that kind of knowledge and education that will liberate, elevate, and stimulate the profession, and gratify them in a new sphere of philanthropic and humane duty; a new era in the cultivation of science, by which the secret powers of every element in nature is to be investigated and drawn forth in new application to the service of our divine art.

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To insure success in this great work of sanitary improvement, as well as to perfect any of the useful purposes of our Association, we must have a united profession; there must be a union of hands and hearts, a singleness of purpose, no irreconcilable division, no claims, no selfish motives.

Organized as a conquering army, with each soldier at his appointed post, intent on the discharge of his special duty, let us sweep before us the puny band of disorganizers, and all the material of a weak and selfish opposition. Impressed with the dignity of this congress of members of a great and humane profession; sensible of the important questions to be considered, involving the material, physical, and moral interests of so many now and so many more in the future; appreciating the solemn responsibilities imposed by virtue of our peculiar relations to society, let us bend our energies to the accomplishment of good alone; let us frown down all attempts to disturb the feeling of harmony and brotherhood, which should characterize an occasion like the present.

Let us admit no discussion of questions foreign and irrelevant to the all absorbing ones of practical interest that await our solution.

For the proper consideration of the problems, involving life and death, that should engage our attention, the trained intellects, the cultivated talents, the sound judgments of the profession throughout the State, (note-worthy as they are,) must seek a higher culture than they have ever yet attained; a culture of lofty purpose; a culture of earnest thought for our fellow men; a culture involving the idea of a higher duty than success as practitioners of medicine; a culture to inspire the profession with a sacred and God-like attribute destined to make mankind more free from suffering, and render them more reverent and noble; a culture involving studies sure to

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separate the profession from mercenary motives, and make the divorce between medicine as a trade and medicine as a humane science, absolute; a culture that will forbid physicians to form a partnership with human maladies, to trafic in sufferings and sorrows, in tears and sighs, as contrary to the genius of medicine, at variance with its humanities, making utter discord with its pure and lofty harmonies.

Medical men must place the science of medicine in the van with other departments of science. Destiny decrees that the world shall be humanized and brought under the controlling influence of science; that the light of civilization shall burn brightly where the darkness and gloom were before impenetrable; that it is in the nature of true science to be cumulative, and her progress is ever to a higher civilization, a loftier sphere.

Go back a few centuries and mark how the record comes down to the present.

Standing at the gates of the Holy City, Jerusalem, turn your gaze on the countless waves of human beings that crowd and jostle one another in the far off east, where two-thirds of the human race make their homes; like the billows of the ocean, they roll on and on in endless succession, and like that ocean at midnight, all is darkness and gloom, save here and there a faint and glimmering beacon light, planted by some missionary hand, attracts the attention of the passing few; the masses regard it not, but joined to their idols and their superstitions they grope on in a darkness and gloom, illumed by no light of science, civilization or religion.

Centuries ago, as if in obedience to the destiny which works out the plan of the great Disposer of events, with whom a thousand years are as a day, science turned her back upon this

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dark sea of humanity, and with stately steps and slow, she journeyed westward.

Her march was marked by all those changes which give wealth, power and influence to nations. On every side she erected imperishable monuments, imposing temples, and planted ineffaceable foot-prints that marked her triumphant progress,—and behold Europe redeemed from the dominion of the wild and barbarous hordes that held her in their sway, now lighted up with the bright fires that fair Science has kindled.

But still westward, ho! and the broad Atlantic is crossed. The red men who were obstacles to her progress fade away before her bright light, as fades the morning mist before the rising sun; the trackless forests, the growth of ages, go down; the monuments of science arise in their places; cities and towns and temples spring into existence; and the surplus population of the teeming East, with all the cumulated gifts that science has bestowed, rush to fill up the vacant places; and another world is redeemed from ignorance and barbarism.

Again from the far off West a cry comes up as if to open the way for yet newer triumphs. Across the great river which had seemed to be a natural boundary line between the lights of civilization and the darkness of barbarism; away over trackless deserts and inaccessible mountain ranges, where the great Pacific washes the shores of California, the cry came of gold! gold in abundance!

It was the tempting cry to lead the pioneers of Science over the tedious journey, and again fair Science leads her hosts,—again she sweeps on her westward path. Whilst no object is too microscopic for her investigating eye, no barrier is huge enough to oppose her progress. She spans the space that intervenes; she bridges over the chasm that separates the

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river from the sea, and lo! the star of her empire rests for a while where the Pacific washes the western sands of America, and she claims yet another jewel for her crown of glory. Perhaps the history of the not far distant future will record another chapter of her onward progress; for still

"Westward the star of Empire takes its way;"

And westward still sweeps the resistless tide of emigration.

The eastern shores of the Pacific will not long confine the impatient thousands who are casting their eyes yet further beyond its limits. Anon fair Science will again lead her hosts among the benighted millions upon whom, centuries ago, when in her infancy, she turned her back and journeyed westward.

Thus is the grand plan of the world's civilization worked out. As in the past, Science has given it to man to take the dark masses that had for ages slumbered undisturbed in earth's bosom, and furnished from her stores the alembic from which was evolved the light by which her votaries could penetrate more widely her hidden secrets; so now she furnishes the material and the means for individuals and nations to investigate the nature of her hidden forces, to appropriate knowledge from her treasured volume of learning, and diffuse the lights of her civilizing influence far and near.

She selects her chosen people for her purposes, and sweeps from her path those by nature incompatible with her higher civilization and development.

You are of those of her choice. Destiny has assigned to you your part in this scheme; Science has placed within your grasp the appliances for the successful prosecution of her august designs. Apathetic and heedless of all this and of your high calling, you are but as rubbish and stumbling blocks in the way of her progress, and of your State's redemption. But true to yourselves, and the behests of Science; true to the

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voice of humanity, and the promptings of patriotic duty, you may from the bounteous treasury of her blessings, bestow health, prosperity and happiness upon our beautiful Alabama.

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EPIDEMIC OF YELLOW FEVER

In Montgomery, Alabama, Summer of 1873.

BY R. F. MICHEL, M. D.

Mr. President and Gentlemen:

Having been appointed under Section eight, Article twenty-nine of your Constitution, to report on "*Yellow Fever in Montgomery*," it affords me pleasure to present my views upon a subject of so much interest and importance to the profession of the State.

At the special request of the editors of the Charleston Medical Journal and Review, and immediately upon the cessation of the Epidemic, I furnished a history of the same for the January number of that valuable periodical.

I have no doubt that many of the gentlemen present are familiar with the views therein expressed; and I should mention here, that, with some few additional observations, that paper embodies almost all the facts in reference to the disease, as it manifested itself in our city.

It may not be irrelevant, however, that your Transactions contain some record of the leading facts which marked the onset and development of this disease in your capital; and with that object alone, I am induced to make this report.

Since the year 1855, notwithstanding the continued and uninterrupted line of travel, by railroad and steamboat, between New Orleans, Mobile, Pensacola, and Montgomery the latter place escaped a visitation from Yellow Fever. Why has she been so fortunate? is a question which naturally suggests itself to our consideration.

I do not believe that our fair city should be placed in the Yellow Fever Zone; and if by any possible means she can be

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there assigned, I, for one, am determined that her position shall be upon its northern border.

A non-contagionist, and one who believes as much in its local origin, as in its being an exotic, can with good grace take the position, that the disease which proved so fatal this year in the city of Montgomery was brought from abroad; did not spring up on its soil; was accidental, and does not properly belong to its climate.

For two months prior to the visit of Yellow Fever, we had been imminently threatened with Asiatic Cholera. Two of the cities of the State, Huntsville and Birmingham, were being then seriously damaged by the havoc of that rapidly fatal disease. Indeed, one case absolutely made its way into our capital, but, fortunately for us, did not take root. In consequence of this condition of affairs, our city authorities worked hard, and worked well, to fend off the threatened invasion; and, with credit to them be it said, they were absolutely successful. With lime, carbolic acid and coal-refuse scattered freely over the surface of the city; with our soil undisturbed, cellars dry, and the offal thrown on the banks of the river, we were safe, perfectly safe, from the disease. I mention this fact, in order to call the attention of the profession to the inutility of hunting for a *local cause*, upon which to build any theory with regard to the advent of Yellow Fever in the year 1873, in the city of Montgomery.

Whence came it? and how did it progress? are two questions which were fully discussed in my history of the epidemic already referred to.

The fever was brought to Montgomery from Pensacola by two persons, who were in that city during the period when this disease was regarded as epidemic. I reiterate this statement from the following facts:

The Golden Dream came into port from Havana on the 10th of June, and went immediately into quarantine; she was detained there twenty-four days, and admitted to protigue on the 3d of July. The sailor, Andrew P. Johnson, from the Revenue Cutter, eight days on board the Golden Dream, sickened on the

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2d day of August, and died with black vomit on the fifth day of August. Several of the stevedores, who worked on board the Golden Dream, contracted yellow fever from sources of infection within that filthy craft itself, at different times during the interval between the first and sixth of August. Dr. R. B. S. Hargis, from whom I obtain these facts, says that three cases were taken sick on the sixth of August. The infecting vessel, the Golden Dream, which did all of this mischief, came out of protigue, and up to the city, *on the third day of July.*

Now, the *two* individuals, who infected Montgomery, left Pensacola consecutively on the ninth and fourteenth of August, from localities *well* within the infected district, viz., *opposite* the hospital, and on the *corner of Tarragona and Zarragossa streets.* In this house opposite the hospital cases of Yellow Fever occurred. One died on the 18th of August; Dr. Whiting attended two of them, Nellie Hoffman and her son. The hospital alluded to had several cases of Yellow Fever within its wards. Miss Elizabeth Cary, who lived scarcely within the infected district, left Pensacola the very day the first case of Yellow Fever manifested itself in Montgomery—17th of August; and a few days after reaching Jayville, Conecuh county, Alabama, died of Yellow Fever with black vomit, on the 25th of August, exactly two days before the first death by this disease in Montgomery.

It is a fact mentioned by excellent authorities, and by the late Prof. James Jones, of New Orleans, *emphatically*, in his published lectures on Yellow Fever—New Orleans Medical and Surgical Journal—and noticed by Dr. R. B. S. Hargis on several occasions, that persons who have inhaled the infection of Yellow Fever—or indeed the morbific principle of any infectious disease—for a certain length of time, and flee to a non-infected locality—the malady develops itself sooner, the period of incubation being shortened—and with greater malignancy than if they had remained where they became infected. Facts are abundant in proof of this.

Upon the arrival of these *two* persons in the city of Mont-

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gomery, they took up their abode in different parts of the city, one in *ward one*, the other in *ward five*. The resume of the cases demonstrates beyond a doubt how these two wards suffered.

I think the readers of my "History" have sufficient evidence that the two individuals already referred to were *thoroughly exposed* in Pensacola to the *Yellow Fever poison;* and, indeed, did not leave there until the epidemic prevalence of the disease.

From the residences of these two persons the disease radiated in every direction, and our city soon fell a victim to one of the most fatal and extensive epidemics of Yellow Fever ever experienced by its inhabitants.

The extent and severity of the epidemic I propose to prove, by the facts that no portion of our city escaped, and that of the few, very few white persons who remained—the number not exceeding eighteen hundred—between four and five hundred sickened with the disease.

On examining the number of white families who lived, day and night, on the three most important streets of the city—Court, Perry, and Madison—I find only seventeen to be recorded. In fact, on Madison only three families remained.

With regard to the mortality, the Board of Health reports eighty deaths by Yellow Fever; I can *now* add twenty-eight to this number.

Of the five hundred cases, we therefore lost, at the smallest calculation, one hundred and eight persons, some of them our most valuable and prominent citizens. Of the hundred and eight, sixty-two are accredited to ward five, eighteen to ward one, and twenty-eight scattered. *Our mortality was therefore over twenty per cent.*

Let us, for a moment, glance at the history of Yellow Fever during last summer, in our sister cities of the South, and carefully note what has taken place elsewhere. All the profession admit that the devastation of Shreveport marks a new epoch in the severity of the disease under consideration. Dr. J. Dickson Bruns states the fact, "that the mortality at

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Shreveport was somewhere between fifty and sixty per cent." Dr. S. M. Bemiss, of New Orleans, says, "the average mortality of Yellow Fever shifts its scale in almost every epidemic visitation of this city; it seems to have reached, and in all probability exceeded, thirty per cent." In the epidemic of 1847, Dr. J. C. Faget places the rate as one in fifteen cases. You will remember, that Blair states, that one death to about seven cases should be the limit of fatality, under proper treatment. Dr. J. F. M. Geddings, of Charleston, says, "in his experience, one in forty in the mildest, and one in ten in the grave." Dr. R. H. Taylor, Secretary of the Board of Health at Memphis,—and we know how they suffered—writes to me as follows: "My books show 1655 deaths up to November the first, and enough afterwards to swell our death role to the terrible number of two thousand, or one in five cases attacked—*twenty per cent.*" Dr. F. A. Ross, whose very name carries with it authority, says, "that in Mobile the average rate of mortality in the epidemics from 1868 to 1870, was from five to ten per cent.

A remarkable feature connected with its history is the number of colored persons who were attacked. It is true, however, that very few died. In Charleston, although occasionally one of this class fell a victim to the disease, they, as a people, were considered almost exempt. I do not remember seeing half a dozen black persons sick with Yellow Fever in the many epidemics I witnessed during my professional life in Charleston. This opinion, although a little at variance with the experience of the able editors of the Charleston Journal and Review, is in conformity with the generally received opinion. In Doctor Dickson's Elements of Medicine, page 277, we read the following language: "While treating on the subject of predisposition, it deserves to be noted that negroes are *less* liable to Yellow Fever than the white race. R. Jackson affirms that no negro, immediately from the coast of Africa, has ever been attacked with it in Jamaica. Lining, writing at a time when there were very few negroes in Charleston except Africans, tells us he 'never saw or heard of an in-

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stance among them.' Again, Dr. Dickson says, 'I have never seen an African negro attacked with it, but I have met with several well-marked cases among 'country born' blacks, though they appear to me much less liable to take it, and, as Rush says, they have it more lightly.' "

A few persons, after leaving our city, became subjects of the disease; two dying and several recovering. The disease, however, *did not spread* in the localities in which they occurred.

Another important question for our consideration is this—did we have any other epidemic disease to treat during the sojourn of Yellow Fever in our city?

The physicians of Montgomery are well acquainted with the fact that during the months of August, September, and especially October, we are busily engaged in attending malarial diseases. It is remarkable that these milder and more manageble affections were *rarely* visible after the appearance of Yellow Fever. I say *rarely*, for I am fully aware that some members of the profession were called upon to treat malarial disease; but what I mean is, that it was not a continual and uninterrupted practice with them. Occasionally we were required to treat these diseases, but I repeat, it was of *rare* occurrence after the epidemicity of Yellow Fever was established; they moved out of the way to give precedence to this terrible pestilence. It is true, that the immortal Sydenham had told us, "that just as one nail drives out another so does epidemic drive out epidemic; I do not mean that the disease which is expelled, and which retreats, disappears altogether; I only mean that it decreases in frequency;" but it was left for the distinguished Dr. Rush, of Philadelphia, to confirm this opinion, when he well said: "If the giant Yellow Fever makes his entrance into a city, all other diseases at once put on his livery." Is this a fact? or, is it a sentence transmitted from authority to authority, in consequence of the great influence of *name*? Is it possible that LaRoche, Dickson, Strobel, Simmons, Fenner, and others, could have transmitted an error of such great magnitude? have they left us such a

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legacy? or was the great physician of Philadelphia correct in this affirmation?

Dr. Dickson says: "If Yellow Fever does not drive out other diseases it certainly *forces* them to put on its livery. In any of the localities where Yellow Fever is endemic, a remittent or intermittent may at any stage of its progress assume the malignant character of the prevailing pestilence, when locally epidemic. In the summer of 1817, many northern and foreign sailors had been induced to go as boatmen up our rivers; considerable numbers of them were brought into our hospitals with country fevers, both remittent and intermittent, which, as soon as Fellow Fever became prevalent, ran into that epidemic, the fever becoming continued, and black vomit ensuing." Blair says: "The intermittent fever is so powerful here (Georgetown, British Guiana) that the Yellow Fever epidemic could not entirely supersede it." Mark the evidence here; it did supersede it, but it could not "*entirely*" supersede it. Y. R. LeMonnier, of Memphis, says: "Any case of Yellow Fever, with two or more paroxysms, should be looked upon as one *complicated with malarial toxæmia*." Dutroulau says: "The march of Yellow Fever is essentially a continued one, with only one paroxysm and distinct stages. Complications with endemic fevers of a paludal origin, at the season during which these are most prevalent, could *alone* have led one to believe that there existed an intermittent Yellow Fever."

Dr. R. B. S. Hargis, of Pensacola, Florida, in a letter to Dr. G. T. Gilmore, published in the March number of the New Orleans Medical and Surgical Journal, for 1874, says: "It was pathologically the same disease preceded by the same Zuma or morbific principle. But there were some hybrids among the last sporadic cases, when malaria began to resume its empire, as it reigned just before the innovation of its ruthless engineer, Yellow Fever. Every endemic Zymotic disease of a pyrexial nature is modified to some extent, or converted by an epidemic of Yellow Fever into the nature of itself. I believe that the Yellow Fever poison is wholly destructive

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of malarial. This very late season has shown this clearly. Just before the breaking out of Yellow Fever, last summer, remittent fever and other malarial affections were rife. *Not a case* was to be seen afterwards; every disease either assumed the livery of the epidemic malady, or was converted into it, as before stated, and got well perfectly at the regular period of convalescence from Yellow Fever. No quinine or any other anti-periodics were used, showing that *Yellow Fever had entirely destroyed the malarial poison.*"

I am one of the many who believe that Dr. Rush was nearly correct when he said that Yellow Fever displaced other diseases. The difficulty with most of the people is to understand the fact that, in an epidemic of Yellow Fever, we have a great many mild cases. Some of our patients are only kept in bed forty-eight or seventy-two hours, but that fact does not prevent us from properly calling these cases Yellow Fever.

Take an epidemic of Asiatic Cholera, painful, terrific and rapidly fatal. See what Professor Niemeyer says of cases of simple diarrhœa, occurring during such a period: "The mildest form is a simple diarrhœa, which is not accompanied by colicky pains or tenesmus, and causes no constitutional or other disturbance, except a moderate degree of depression and relaxation. The evacuations follow each other more or less closely; they are very copious and watery, but have neither lost their odor nor color. These cases do not appear on the official lists as cholera; but although the police do not consider them as such, science should do so." These persons transport Asiatic Cholera by their *dejecta.*

Now, if these simple cases are regarded as mild attacks of Asiatic cholera, why should we not at once admit the mild cases of Yellow Fever, attended by a *chill,* followed by *fever,* pain in the head and back, and slow convalescence? Look almost anywhere for authority, and you find the fact admitted that there is the "mild," or "*simple*" form, as well as the "*gravior*" and the "*malignant*" form of Yellow Fever. Blair says, "*you may have the disease from a flea-bite to the plague.*" That is appearing as a case of the simplest kind of mild sick-

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ness, or again assuming the form of a terribly malignant disease. The thing is to recognize *different degrees of susceptibility, and of acclimation* in the individual; and also different *doses of the poison* or *degrees of its dilution.* Take, if you please, either Scarlet Fever or Asiatic Cholera, and you see this point equally well exemplified. Epidemics differ much in this regard, some having a very large proportion of grave cases, others the reverse.

I must confess my great surprise, that the moment an epidemic of Yellow Fever is established, that instant some few members of the profession, not appreciating the milder cases, but believing that the virulence and fatality of the malignant ones should place them alone in the catalogue, at once find out that other diseases are rife in our midst. It is "Catarrh," "Epizooty," "Ephemera," "Break-Bone," or more fashionably, "*Dengue.*"

During the epidemic of Yellow Fever through which we have just past, I saw no case of Dengue or Break-Bone or any other disease, if we except *a very few cases* of malarial affections. And I am fully sustained in this opinion by the profession of Montgomery.

In order to elicit discussion, and for the proper understanding of this important point, I will digress for a few moments and invite your attention to the well-marked and characteristic differences between Yellow Fever and this *fashionable associate.*

Prof. Samuel Henry Dickson, the most elaborate writer upon Dengue, thus describes it:

"Dengue usually made its invasion with pain, stiffness, and swelling of some of the smaller joints, often of the muscles of a limb, rigidity of the neck, aching of the back and loins. These pains were followed, after an uncertain, though generally brief period, by headache, suffusion of the eyes; abrupt, full, frequent pulse; hot, pungent, dry skin, restlessness, thirst, and other tokens of febrile excitement. The fever did not remit, but declined and disappeared in a great majority of cases on the second or third day. In this early stage the tongue

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was generally clean, and the stomach quiet; but sometimes there was nausea or even vomiting, the determination to the head was occasionally violent. Instances occurred in which delirium was among the first symptoms, coming on at the commencement and enduring until the subsidence of the febrile paroxysm. At this time the skin lost its heat and dryness, becoming relaxed, with abundant perspiration, and the local pains were all lessened in degree. A sort of miliary eruption, or rash in some persons, attended this sweating stage, and in a few others preceded both the local pains and the fever. It was, however, as connected with this first stage of dengue, a very inconstant symptom, seeming rather a coincidence than a symptom. The pains of the joints and muscles which, as has been said, were diminished in severity at the subsidence of the febrile exacerbation, did not go off entirely; a degree of swelling, stiffness, and tenderness of the affected parts remaining permanently though varying much in intensity in different individuals. This condition of things constituted a sort of deceptive interval between what may be described as the first and second stages of this strange disease. Many now believed themselves to have passed through the attack, and attempted to resume their ordinary occupations; but soon had occasion to discover that their sufferings were by no means at an end. On the third or fourth day, there being no fever present, or a very obscure degree of it, the tongue would begin to be coated with a yellowish fur, and the stomach would become distressed, uneasy and irritable. The patient was now low-spirited, fretful and anxious. Vomiting come on in some, with great langour, lassitude, debility, and restlessness at night. This was regarded as the most oppressive and insufferable of the stages of the malady. On the fifth or sixth day from the invasion, the period varying somewhat in different individuals, the annoying symptoms just described were relieved by the coming out of an abundant eruption, met with so constantly and in so very great proportion of the cases, that it clearly demands to be considered a characteristic and essential circumstance in the history of the

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disease. It consisted of minute papulæ, somewhat elevated, of a florid red, and distributed in irregularly shaped patches; the feet and hands being somewhat swollen, with a sense of numbness and thickening. It appeared first on the face, then on the trunk and thighs, gradually spreading to the extremities. It resembled scarlatina more than measles, in the hue and aspect of the skin, but was less diffused or confluent than either. When fully developed, it was attended with some itching and burning of the surface, and at this time a second febrile paroxysm came on, with return or aggravation of the muscular and arthritic pains. Inflammation and enlargement of the lymphatic glands in the neck, axilla and groin, attended in a good many cases; these parts being apt to continue swollen and painful for some time after convalesence was finally established. In a few instances suppurations of these tumors took place. The eruption disappeared after two or three days' duration, becoming gradually paler, with some desquamation of the cuticle. Of all the symptoms of Dengue the affection of the joints was the most tenacious and troublesome, adhering for weeks to some patients, and constituting a sort of permanent lameness or loss of mobility. Nay, even so late as 1835, some of the population of cities visited by this plague persisted in speaking of the rheumatic or quasi-rheumatic decrepitude and pain under which they labored as the effects of Dengue."

"Pregnant women, when attacked, were very liable to abortion, and a remarkable number of miscarriages and premature labors occurred. A sore mouth was among the frequent symptoms; ulcers formed in the mouth. Dengue is to be classed properly among the exanthemata. It is an eruptive fever, of distinct and specific character. Its essential symptoms are, in the first stage, a painful affection of the joints and muscles; and, in the second, divided by an interval obvious and sufficiently regular, a cutaneous eruption. The arthritic inflammation of the first stage was attended by fever of the ordinary inflammatory type, of twenty-four to forty-eight hours' duration. The eruption was preceded, as is usual in

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the exanthemata, by considerable gastric oppression, with nausea, and sometimes vomiting."

The following record with regard to Dengue is in publication: In Augusta, 9,000 cases; in two epidemics in Charleston, 25,000; on Sullivan's Island, 500; Philadelphia, 250; Savannah, 10,000; New Orleans, 50,000; Mobile, 6,000. *Over one hundred thousand cases and not a death.* Dr. Dickson, the highest authority on Dengue, says, on page 748: "Nobody dies of Dengue or Breakbone; no, not one in one thousand, taken promiscuously and under all circumstances of discomfort or mal-treatment." DaCosta, page 722, says: "Dengue is a harmless disorder."

Look carefully at the premonitory symptoms; watch well the kind and severity of the pains, which mark the onset, continuance and termination of Dengue. No chill—mark that; no mention of even a rigor. Observe the intermission, not accidental, not occurring by chance, but regular, never deviating, always coming to the relief of the sufferer, and to be counted with certainty by the hands of the clock. Then examine the secondary fever, accompanied almost always by an eruption that Dr. Dickson says "clearly demands to be considered a characteristic and essential circumstance in the history of the disease." Look at the prompt convalescence of Dengue, with the deformed and enlarged joints; the patient, staggering about, bald-headed, with stick in one hand, or crutch in both. Observe the common accident of abortions and premature labors, and then say if this condition of things resembles, however remotely, not the violent cases of Yellow Fever, with black vomit, discoloration and bleeding from gums lips, uterus, and nose, but the milder and more numerous cases of Yellow Fever frequently met with during an epidemic, easy of control, but very tardy in convalescence.

Pathologically considered, dengue is one of the Exanthemata; and being such, I do not believe it hæmorrhagic in character. Pathologically, or, more correctly, pathologico-anatomically considered, the Exanthemata are "*Dermatites*," and as such hæmorrhage can no more be esteemed an essen-

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tial feature than in inflammation of other organs. The hæmorrhagic feature of the Exanthemata, when manifested, is to be considered as an epiphenomonon, a complication, having no essential connection with the pathological process going on in the skin; that is, if we restrict the term hæmorrhage to the escape of the blood, in its entirety, from the vessels.

Hæmorrhage complicating the Exanthemata, is the expression of—1st, an abnormal tenuity or fragility of the vessels; 2d, of qualitative alterations in the composition of the blood. The first condition, though often manifested in the course of the Exanthemata, is not an essential feature. The second condition, although always present, does not always terminate in hæmorrhage. Hence, "*the Exanthemata are not, pathologically considered, Hæmorrhagic.*"

In the exanthematic fever, in which we most frequently see hæmorrhages of the skin, viz., variola hæmorrhagica, the extravasation of blood usually takes place when the Erythema which precedes the Exanthem, makes its appearance. Such patients usually die before the eruption characteristic of variola reaches the vesicular stage, in certain cases before it breaks out.

Another reason for my opinion, that Dengue can not be considered pathologically a hæmorrhagic disease, is based upon the fact that scarcely any one, who has written upon this affection, speaks of its Hæmorrhagic Character. Now, I propose to invite you to investigate carefully this point in the various papers which have been published upon Dengue.

The English and French writers say nothing of it. As a disease generally recognized, or of wide-spread or even occasional occurrence, it seems to be unknown in Europe. Doctor Sam'l H. Dickson, of Charleston, in his last perfectly revised paper on Dengue—"Elements of Medicine," page 744—although it is the most extensive and elaborate essay upon this subject ever written, does not hint at its bleeding under any circumstances. Dr. Wm. T. Wragg published a very valuable paper upon this disease. Not being able to procure this article, I wrote to the Doctor on the subject. In his reply, he

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says: "My impression is, that there were no Hæmorrhages, but it is so long since I have seen my paper that I am not certain." Dr. Fenner, of New Orleans, in writing upon the fevers of New Orleans, alludes to Dengue, and says, "he did not believe it existed in that city, for when the patients had *hæmorrhage from the stomach*, it was promptly admitted to be *Yellow Fever*." Dr. Wm. H. Anderson, of Mobile, in his Report on the Diseases of Mobile, read before the State Medical Association in 1850, speaks of the extensive epidemic of Dengue, but does not allude to its hæmorrhagic character; and in a letter to me last January, says: "I have been through several extensive epidemics of Dengue; have seen it almost every summer; have had it in its worst phase myself. But I never saw anything like a hæmorrhagic variety of it. Nobody here ever saw a hæmorrhagic variety, unless he wanted to see it—*and then it was not Dengue*." Dr. Austin Flint, in his beautiful and valuable Treatise on the Principles and Practice of Medicine, page 935, in writing of Dengue, says, "that hæmorrhage from the nose, mouth, bowels and uterus occurs in some cases." This statement, from such high authority, concerned me much, and I wrote to the Doctor to get his individual opinion with regard to the facts. Last month he wrote me as follows: "Yours of the 18th ult. is received. In reply to the question, *If in my opinion I ever saw a case of Dengue bleed?* I have to say, that my experience as regards this disease is almost nil. My account is, therefore, as I state in my work, based on the observations of others." And again, in a letter of July 8th, the Doctor writes: "I should infer, from facts reported by different observers, that *Dengue can not be called a Hæmorrhagic Disease;* but that, in certain cases, hæmorrhage occurs, just as it does in Small Pox and Measles."

Dr. Flint had been appointed by the American Medical Association, Chairman of the Committee "on Practical Medicine," and in the report found in the fourth volume of the Transactions, he sums up everything that had been recorded with regard to the epidemic of Dengue in the various southern cities, Augusta, Charleston, Savannah, Mobile and New Or-

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leans; and in these various articles, "Hæmorrhage in Dengue" was observed by only one of the authors alluded to.

I have come to the conclusion, therefore, that this statement of Dr. Flint was procured from a paper published by Dr. Henry F. Campbell, of Augusta, entitled "History and Treatment of Dengue Fever prevailing in Augusta in the year 1850." This valuable publication can be found in the Southern Medical and Surgical Journal for January, 1851. Every one acquainted with the reputation and position of this distinguished gentleman, knows that he records faithfully what he saw; and he writes of the hæmorrhagic character of Dengue.

Now, with the fullest assurance of respect, I must conclude that there were some complications, some atmospheric peculiarities in Augusta during that epidemic; for, in my limited reading, I find no authority upon the subject, who has even hinted at such a condition. Dr. Arnold, of Savannah, Georgia, a capable observer, in his history of the two epidemics of Dengue in that city, 1848 and 1850, published in the sixth volume of the Charleston Medical Journal, says not a word of its hæmorrhagic character. Nor does Dr. Wm. R. Waring, of the same city, who reports the epidemic of 1830, in the April number of the North American Medical and Surgical Journal. Copeland, Nicholson, Hester, of New Orleans, Duperier, of New Liberia, La., and others, do not allude to its bleeding.

I must, therefore, repeat that, Pathologically considered, Dengue is one of the Exanthemata, and can not be regarded as Hæmorrhagic in character.

With reference to the pathology of Yellow Fever, I have hardly anything to say. We made no *post mortem* examinations, and very few chemical investigations; consequently the researches of Blair, Lewis and Joseph Jones were not again repeated and confirmed. We did not use the thermometer or the sphygmograph, hence the valuable researches of J. C. Faget, M. D., also, were not repeated. By means of these scientific investigations, we are enabled to prove the specific character of Yellow Fever, for "with watch in one hand and a thermometer in the other, its differentia-

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tion from pernicious or malignant paludal fever is demonstrable without the possibility of cavil or doubt."

I examined the urine and black vomit of several cases; found albumen as stated by Blair in the one, and the characteristic features of the other, as *first insisted* upon by Dr. Middleton Michel, in the Charleston Medical Journal, May, 1853. I believe nothing has been accomplished worthy of note with regard to the microscopal examination of black vomit, since Dr. Michel published this paper. It may not be irrelevant just here, to re-produce the *results* of these investigations, as the article is almost out of print, in consequence of the destruction of our valuable periodicals during the late war. I do this the more cheerfully because I read continually of *recent* researches upon the subject of Black Vomit, without any additional information imparted, and certainly without any reference to Dr. Michel's valuable investigations.

Forty samples were microscopically examined, under varied circumstances, in and out of the stomach and intestines, in the fresh and putrescent conditions, and under the influence of certain reagents.

Though generally reddish-black, it often presented a brown, reddish or blackish-brown, and sometimes claret color. From one patient who ejected large quantities and ultimately recovered, the liquid was bright red, recognizable as pure blood with black flocculi in the sediment, while one sample was of chocolate color with a brownish residuum. Some resembled a strong infusion of senna, holding in suspension the ordinary black clots and granules; others, even in a state of rest, were more like a solution of bismuth and Indian ink; some again were perfectly black, and these were such as I procured from the stomach. The intensity of color is much influenced by rest or motion, as it acquires a denser shade whenever the fluid is agitated, and the granules, flocculi, and coagula are made to float; on the contrary, these particles, when the liquid is at rest, settle at the bottom, being specifically heavier than the former, leaving the supernatant liquid comparatively clear, sometimes transparent as serum. This is not always the case,

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however, as I have seen the solid portions in the same sample equally divided into such as formed a sediment, and such as floated on the surface. The quantity which may be produced and ejected in a given time materially affects the color, this being of a brighter red whenever the fluid is thrown up in abundance until it frequently amounts to pure blood; whereas, the dark black and granular aspect, with the coffee-grounds sediment, described as characteristic of black vomit, belongs particularly to the smaller portions which are early vomited—a circumstance which claims special attention, as it will be found to account for the difficulty experienced in producing these exact particles in the artificial trials which we made with blood and acids, as well as for the occurrence of pure blood of the scarlet hue in many instances of hæmatemesis. It is proper to remark that there is rarely, if ever, any greenish or yellowish tinge observable, no evidence whatsoever of the presence of bile; and I believe this is the concurrent testimony of all who have taken the trouble to repeat Dr. Warren's tests. If bile is ever met with in black vomit, it is merely accidental. In every instance we found the vomit decidedly acid, turning litmus-paper red. This acid is detected as free muriatic, which is present in gastric juice according to recent investigations. The acid property of the vomit is most remarkable, for I made constant inquiries of those suffering from this symptom, and they frequently complained of an acid burning sensation in the throat and pit of the stomach, referable doubtles to its presence. The elimination of this acid seems to be without restriction, for in one case basin-full after basin-full was thrown up, presenting the same reaction.

We always found the filtered liquid perfectly transparent, with the exception of such amorphous granules as sometimes swim through serum itself. Some of the most minute specks selected from the coffee-grounds sediment presented under the miscroscope every resemblance to coagulated blood, appearing as so many dense opaque masses tinged darkly with hematin. Here and there were congeries of granules invested with the same coloring ingredient. Small portions, rendered

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less opaque, were found to consist of shreds or beds of mucus containing long, numerous scales, granules, and some blood-disks. Epithelial cells, of every variety, except the ciliated, were found. The *scaly*, *columnar*, and *spheroidal* have at different times been plainly made out with their nuclei and nucleoli, but in very different proportions—the scaly or columnar cells being always most numerous. Many of these latter are seen as perfect in shape as when artificially removed from the mucous surfaces of the throat, gullet, or mouth, and frequently united by an adhesive intercellular matter in the order of the hexagons of a tessellated pavement, some presenting at their centres accurately defined nuclei, which the addition of a little diluted acetic acid rendered even more apparent. These are evidently shed from the mucous lining of the esophagus, pharynx, back part of the fauces and mouth during the act of vomiting, and are stretched along so extensive a surface as at once to account for their frequency. The abrasion which these surfaces sustain results from the acridity of the matters vomited. But if carefully examined there is no sample which will not disclose the presence of the columnal epithelium of the gastric membrane.

An inspissated viscid form of mucus constitutes a conspicuous feature of black-vomit. Condensed into glutinous masses, as it were by the action of the acid secretions, this substance was filled with granules, and the relics of epithelia, entangled with which it in a measure owed its consistency, and but for having imbibed a certain amount of blood, exactly resembled fluor albus, as seen with the microscope. The mucous globules bear no relation in point of numbers to the masses of this albuminoid ingredient, they were few and scattered about the field; presenting as they do generally a well defined outline and a granular surface, these were conspicuously more translucent, and their contour less distinct, though the granular appearance was sufficiently evident in most cases. They were distended by the endosmodic imbibition of the aqueous solutions in which they appear. A strong mixture of salt and water disturbed their transparency and diminished

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their size by corrugating them. The viscid mass was not composed of mucous globules, for where it exists in greatest abundance, in the stools, for example, these were wholly absent. When compressed into a thin layer, this mucoid mass appeared as a soft, homogeneous, granular, and filamentous structure, the shreds of which, matted together in an irregular manner, somewhat resembled fibrin, as it is seen to coagulate when microscopically inspected, or perhaps like albumen coagulated by acid.

Blood, in a broken-down and altered condition, is met with invariably in abundance; indeed, it is this which constitutes black-vomit *par excellence*. Every object under the microscope is intensely colored by it, as a large proportion of hematin appears to be in complete dissolution. It need hardly be remarked, that the blood-corpuscles are entirely separated from each other, and never seen in rolls or piles, and equally changed in physical nature. We see no disks, or but few turning edgewise while in motion. The vast majority are entirely dissolved, a granular detritus being all that remains even in the freshest condition. Some again are spheroidal, distended, or otherwise misshapen, most generally corrugated, measuring the one three-thousandth of an inch, undergoing exactly the same modifications as we produce at will by treating them with acetic, nitric, hydrochloric acids or concentrated saline solutions.

The following are Dr. Michel's conclusions:

1st. That the microscope has furnished decisive proof of the nature of that black matter formed within the entire length of the digestive canal; showing that it is blood chemically altered by the action of acids wherever it is seen, whether in or out of the vessels—the acids being hydrochloric when derived from the stomach, sulphuric acid of the sulphuretted hydrogen, or carbonic and lactic acids, when obtained throughout the remaining portions of the canal.

2d. That the pasty and figured stools are composed of the black matters which have lost all of their characteristic features but the color, having undergone a process of digestion.

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3d. That no animalculæ are discoverable in either fresh or putrescent black-vomit; but as it decomposes, certain fungi are disclosed, which are most frequently, if not always, developed outside of the body, depending upon, though not the cause of, fermentation.

4th. That the artificial black matter produced by the addition of an acid to blood, is in every respect analogous to true black-vomit, being both physically, chemically, and microscopally identical.

Dr. Joseph Jones has stated that the lesions of the heart are characteristic in this disease; that the heart is structurally altered and enfeebled; oil and granular albuminoid or fibroid matter, is deposited within and around the muscular fibrillæ, and the organ after death presents a yellow, flabby appearance. He says we must keep our patients quiet, in order that the heart may be restored to its free and vigorous action. The profession owe Dr. Jones a debt of gratitude for his very practical, pathological demonstrations.

This feeble condition of heart was frequently observed. In the case of my son, Middleton Michel, I found his heart at forty for three days and nights, and for several hours during that time only beating thirty-eight per minute; even now, five months since his attack, it frequently intermits.

It is well known that this peculiar disease, in its initial stage, may be characterized by individual idiosyncracy. I know of five cases in which the disease was ushered in with convulsions, and most of these were in persons of intemperate habits.

Some of the cases were prolonged for fifteen or twenty days before they terminated fatally, while others were rapid in their results. One died with black vomit, exactly eighty-five hours after the initiatory chill. Most of the fatal cases, however, are recorded as dying on the fifth or ninth day.

Abortions, occuring during the febrile attack, as a general rule, proved fatal. This was not the case when the product of conception was carried to its full term. Almost all of the cases occurring among females were accompanied by hæmor-

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rhage from the uterus. This bloody sweat from the mucous membrane of the vagina and uterus was first described as a symptom of Yellow Fever by Dr. Middleton Michel, in the fifth volume of the Charleston Medical Journal. I was present and assisted my brother in these pathological investigations, and can now further confirm his statements from observations during this epidemic.

In the uterus, tubes, and ovaries, unexpected appearances were detected. The uterus contained blood proceeding from its inner surface, which was spongy, and the blood exuded upon pressure. The fallopian tubes were in the same condition. The ovary exhibited two, three and sometimes more points, which proved to be extravasated blood pent up within its cells.

The display made by these organs might very easily impose the belief that these subjects were menstruating; and that *copora lutea* had been detected in the ovaries; but an attentive examination proved that such was not the case; Dr. Middleton Michel instantly expressed his opinion that here was another evidence of extravasation and hæmorrhage of the parts so indicative of this disease. Subsequent observation fully sustained this opinion, for every female examined—and we opened the bodies of many—presented the same appearances. Dr. Michel adds: "If indeed, I was asked which was the most constant pathological change observed in Yellow Fever, I should be strongly inclined to admit the above-mentioned circumstance, if it was not confined necessarily to females."

Many authorities speak of the *catamenia* as often observed during this disease; and others again refer to hæmorrhage from the vulva; but Dr. Michel was the first pathologist, who noticed and published, *the frequent, perhaps invariable hæmorrhagic state of the internal genital organs of the female as a symptom of Yellow Fever.*

Every female I attended last summer during the epidemic, for Yellow Fever, was in this condition, and I invariably made special inquiry with reference to this important point.

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Another fact in connection with the pathology of this disease, is the development, during convalescence, of an inordinate venereal appetite. My attention was directed to this peculiarity by an intelligent professional friend; and after inquiry in reference to this matter I find it was signally observable in both male and female. Why such a condition obtains, I cannot imagine; especially when we are cognizant of the very tedious, and dangerous convalescence, in Yellow Fever.

TREATMENT.

With regard to treatment, the profession here generally believing the disease self-limiting, seldom resorted to medicine.

When called to see a case, the patient was placed in a hot mustard bath; castor oil or seidlitz powders were resorted to as aperient; very few, if any, administered mercurials. Mild diaphoretics and diuretics were used, as orange-leaf tea, black tea, or sage tea. After the full effect of the bath was realized, the action on the skin was kept up by warm mustard pediluvia administered under the covering, without exposure of the person.

In the stage of restlessness, chloral was given generally by the rectum, rarely by the mouth, with good effect. Narcotics were regarded as unsafe remedies. For myself, as soon as I found sighing respiration, and frequent eructation, I generally placed a large blister on the epigastric region. In the case of my son, who had black vomit, I feel assured that it controlled the nausea.

Stimulants, as a general rule, were avoided, except during convalescence, when they were used in order to assist the heart in its propulsive efforts. Brandy and Champagne were those most frequently given. In cases attended with great prostration they were very cautiously administered during the febrile stage.

Solid food was strenuously avoided; but beef tea, milk and lime water, gruel, chicken broth, and arrow root, permitted.

Rest, absolute rest, was insisted upon; and hence very few cases of sudden death during convalescence are reported.

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An equable temperature in the sick room was constantly maintained.

Quinine was only used as a prophylactic, and in some cases with apparent success.

It will be observed, on examining the tables of Mr. G. A. Clum, to whose kindness I am indebted for the valuable meteorological records, kept carefully by him during the epidemic, that the fever traveled with, and against the wind; and that rain, or clear weather, made no material difference in its severity. But when we come to the consideration of the effect of cold, we find again the old established and well understood principle carried out: Frost destroyed the Yellow Fever poison in Montgomery, just as it does in every locality.

The first frost occurred on the twenty-first morning of October. This was so slight as not even to kill tender garden plants, and many persons in the city denied its existence. On the morning of the 29th of October we were favored with a "black frost," frost with ice. The same thing occurred on the following morning, and on the morning of the 31st of October we had a white frost.

No one coming into this atmosphere after the twenty-ninth of October contracted the disease.

We all know, that the period of incubation in Yellow Fever varies from twenty-four hours, as reported by Blair at Demerara in 1837, to two months, as stated by R. Jackson, of Port au Prince, page 247 of his Outlines. Ferguson says of Monk's Hill, that the atmosphere was so pestiferous that soldiers mounting night-guard in perfect health, were seized with furious delirum, while standing sentry, and when carried back to their barracks, expired in all the horrors of the black vomit within less than thirty-six hours of the first attack. Dr. La-Roche says: "From all the facts I have myself been able to collect, I am of opinion that, though sometimes very short, and at others very long, the period of incubation in Yellow Fever usually varies from five to ten days."

Now, taking ten days for the full period of incubation, and nine days for disease and death, we should not have had a

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death by Yellow Fever recorded in Montgomery after the seventeenth of November. But we find the last recorded death as occurring on the night of the thirtieth of November, (Mr. Whetstone), a period of thirty-two days from the first heavy frost.

Previous to this epidemic, Montgomery had been visited three years consecutively by Yellow Fever—1853, 1854, 1855.

Having no medical record to guide us in drawing a comparison between these visitations, and the one through which we have just passed, I have selected a most reliable account, carefully prepared by an old citizen, Mr. M. P. Blue. This record has been kept with zealous care, in the Supreme Court Library of the State.

In comparing these three epidemics with that of 1873, it is very observable that the disease this year has been more grave, more extensive, and remained with us longer than it ever did before:

"The Yellow Fever was first declared to exist in this city the latter part of September, 1853. The first interment from the disease was on the 22d of that month. The total interments for that month were twenty-eight whites and eight colored; of the whites, nine were Yellow Fever. In October, 1853, of the fifty-three whites interred, twenty-two were from the fever. In November, 1853, there were four interments from the fever.

"In September, 1854, there were twelve whites interred, of which six were from Yellow Fever. In October, 1854, of the fifty-two whites interred, thirty-seven were of persons dying from that fever. The largest number buried in one day, was on Sunday, the 22d of October, 1854, which was the following named *seven:* Joseph Knox, James Narramore, Mrs. Clara Connally, Oliver Reed, Miss Frances McGuire, Mary Binnard, and Isidore Binnard. In November, 1854, there were two interments from the fever.

"In September, 1855, of the seventeen whites interred, seven were from Yellow Fever, and in October, twenty-one of the thirty-four were from the same disease. In November, 1855,

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there were two Yellow Fever interments among the whites."

In conclusion, permit me to call your attention to the subject of Epidemicity in Yellow Fever, and to point out a general rule governing Boards of Health, wherever this disease is prevalent, viz.: "*That the deaths by the epidemic disease should exceed the deaths by all other diseases.*" This rule, in my opinion, is as arbitrary as it is unscientific; one which should be honored more in the breach than the observance.

Undoubtedly, in a purely professional case, the term epidemic is applied to diseases with very different degrees of prevalence, so that it becomes difficult to decide when, as physicians, we should pronounce a malady "Epidemic." Would it not be a better rule, "to regard a disease as epidemic which has become so prevalent in a population, that we meet examples of it more frequently than we meet with cases of any other *one* form of disease."

"Especially would this rule hold good, if, in addition, we find this disease not confined to a limited section, but scattered, and leading to the inference that any of the people may be the next victim. In other words, as the derivation of the term Epidemic implies, that it is *upon the people.* If the cases are so numerous, occur in such quick succession, and are so scattered as to locality, as to render questionable the idea of their being *simply sporadic*,—no matter how many die,—the disease is clearly *Epidemic.*"

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THE YELLOW FEVER EPIDEMIC OF 1873.

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PART FIRST.

THE HISTORY OF THE EPIDEMIC.

INTRODUCTORY.

In the arrangement of the various topics connected with the recent expidemic of yellow fever, I shall first give some account of the circumstances attending the advent and progress of the disease in the principal localities which it has invaded; and will then, in separate sections, discuss the more important questions involved in the consideration of its causes, its transportation from place to place, and the measures of prophylaxis employed against it.

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I have taken much trouble to obtain full and accurate information. Nevertheless, it will be seen that in relation to most of the subjects mentioned, the detail of facts is inadequate and unsatisfactory. It is true, that many accounts of the epidemic have been published, especially of its behavior in those cities which have suffered from it most severely. But the more these accounts are studied, the more they are found to be superficial, uncritical, and unsatisfactory; and sometimes they are still worse—that is to say, they are equivocal, sophistical and false.

If the field of the inquiry afforded by the recent epidemic had been more industriously and more wisely cultivated, it is hardly to be doubted that valuable contributions would have been made to our knowledge of the natural history of yellow fever; and to the protective resources of public hygiene. But even as it is, the careful study of such facts as I have been able to collect will be found to yield us some items of important information.

I add here a tabular statement of the number of cases and the number of deaths which occurred in the several cities and towns which are included in my historical sketch. The number of cases has been obtained, in each instance, by rather loose methods of estimation, and nothing more can be claimed in the way of accuracy than a sort of general approximation towards the truth. The number of deaths, being obtained from actual records, may be accepted as substantially correct:

Yellow Fever in 1873—Cases and Deaths.

New Orleans—Cases.....	2,000	Deaths.....	226
Memphis, "	10,000	"	2,000
Shreveport, "	3,000	"	759
Pensacola, "	600	"	61
Montgomery, "	500	"	102
Calvert, "	450	"	125
Mobile, "	210	"	35
Totals—Cases.....	16,760	Deaths.....	3,308

If to these totals were added the cases and deaths in the

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cities and towns and country places, which were visited with more or less severity by the epidemic, but which, for various reasons, I have been obliged to omit from my report, the number of cases would perhaps be swelled to a grand total of more than twenty thousand; while the aggregate of deaths would exceed three thousand five hundred. This would give an average mortality of 17½ *per centum* of the cases.

THE EPIDEMIC IN NEW ORLEANS.

The first case of yellow fever in New Orleans in 1873, which was also the first in the Mississippi Valley, occurred in the person of J. M. Arrua, mate of the Spanish bark Valparaiso. The Valparaiso left Havana on the 15th of June, in ballast, with twenty-one souls on board, all in good health. She arrived at the Mississippi quarantine station, below New Orleans, on the 24th of June, and was detained there for three full days, during which time she was thoroughly disinfected, twice with chlorine, and twice with carbolic acid. The disinfection was done both between decks and in the forecastle, and at night the hatches were left open for ventillation. She reached the city on the 26th or 27th of June, and was docked at pier 48, at the head of Second street, in the Fourth District, two miles above Canal street.

Arrua was taken sick with yellow fever on the 4th day of July, remained two days on the vessel, was then taken down to the Third District, a distance of three miles, to 448 Moreau street, where he died on the 8th of July. The vessel on which the attack commenced, and the house in which he died, were both subsequently disinfected. No other case of the disease occurred in either.

There is no question that this was a case of yellow fever, but there is some question as to where the disease was contracted. Was it in Havana? Or was it on board the Valparaiso? Or was it at the wharf in New Orleans? The Captain of the Valparaiso insists that Arrua contracted his sickness in New Orleans; and the New Orleans Board of Health admits that there are some grounds for this opinion.

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Next above the Valparaiso, at the distance of about one hundred feet, lay the steamboat Belle Lee. The mate of this boat, Edward Hynes by name, was taken sick with yellow fever on the 12th of July, and died on board on the 20th. Subsequently, a carpenter and a painter, who had been employed on the Belle Lee, also sickened and died. In the meantime the boat was moved to the lower part of the Sixth District, and moored between Louisiana and Napoleon Avenues, at which point a new focus of infection was established, about which clustered thirty-seven cases and twenty-five deaths.

A little above the Belle Lee, the distance not mentioned, was the steamboat W. S. Pike. Three cases of yellow fever occurred on this boat—the first on the 28th of July, the second on the 29th, the third on the 30th.

During the months of August, September, and October, several other vessels were docked in this same neighborhood where the Valparaiso, the Lee and the Pike had become infected, and these also suffered severely, a considerable number of cases occurring on board of them, with several deaths. Several of these vessels were removed, like the Belle Lee, three miles below, to the Third District, and seem to have conveyed the infection to the wharves of that locality.

About half the cases occurring in the Third District originated on shipboard; and it is worthy of special remark that disinfection here utterly failed to check the progress of the disease. Dr. J. T. Newman, Sanitary Inspector of the District, tells us that "the forecastles and holds of infected ships were treated in the same manner as infected houses; but fresh cases occurred on the same ships even after the process of disinfection;" and it appears from other statements that cases continued to occur in this way in ships in which disinfection with carbolic acid had been several times repeated. This led to the suspicion that the wharves at which the vessels were anchored had become contaminated with the fever poison, and were the true sources of the infection. These structures were therefore subjected to the carbolic acid treatment; and after this was done we are told that the

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disease subsided. But was the subsidence due to the disinfection? This is what we are expected to believe, but it may be fairly doubted. The disinfection of the wharves was done on the 2d of November; but already a far more powerful agent of disinfection than carbolic acid had been at work. *There was frost on the 30th of October.*

In the Fourth District, according to the report of Dr. Alfred W. Perry, the Sanitary Inspector, there occurred altogether one hundred and twenty-three cases. The number that originated among the shipping is not stated. Neither do I find any account of the disinfection of vessels or of wharves in this district. If the vessels and wharves were disinfected it is a little surprising that the results of the experiment have not been reported. If they were not disinfected the health authorities, with their emphatic confidence in the efficacy of carbolic acid, are amenable to the charge of very strange and very culpable negligence. It was in this same Fourth District that the fever committed its principal ravages in 1871 and in 1872; but upon each occasion it has occupied a different portion of the district. In 1871 the region of greatest infection lay around the intersection of Washington and Magazine streets; in 1872, around the intersection of Jackson and Magazine streets; in 1873, between Chippewa street and the river. In July, of six cases in the district, all were between Chippewa street and the river. In August, of twenty-five cases, twenty-three were between Chippewa street and the river. In September, of fifty-four cases, forty-one were between Chippewa street and the river. In October, of thirty-two cases, eighteen were between Chippewa street and the river. In November, of six cases, three were between Chippewa street and the river. That is to say, in sums total, of one hundred and twenty-three cases in the district ninety-one were between Chippewa street and the river. General disinfection was commenced in this quarter of the city, as well as in other infected regions, during the first week in August. It was practiced without intermission, from week to week, and from month to month, on a more

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extensive scale than has ever been attempted anywhere else in the world. What was the result? Simply this: that the disease maintained the conflict on its chosen battlefield until the coming of the frost, unterrified and defiant to the last.

Up to the 13th day of November, one hundred and five cases of yellow fever were received into the Charity Hospital, an immense institution, which occupies an entire square, with a large number of internes, nurses, and patients sick of other diseases. Of these one hundred and five cases, twenty-seven had recovered, sixty-eight had died, and ten were still under treatment. No disinfection of any kind was practiced here; the disease manifested no disposition whatever to spread; and only two cases originated within the hospital.

Some general conception of the extent to which the aid of disinfection was invoked in New Orleans during this epidemic may be drawn from the fact that bills for disinfectants ordered by the President of the Board of Health were presented for payment to the Administrator of Police to the aggregate amount of sixteen thousand two hundred and seventy-one dollars, ($16,271.)

The total number of cases reported to the Board of Health for the year is three hundred and eighty-eight. The total number of deaths is two hundred and twenty-six. This represents a mortality of 58.24 per centum, and would indicate a type of disease of almost unprecedented and altogether appalling malignity. But the figures representing the number of cases, notwithstanding their official character, are entirely unreliable. Indeed, it is safe to say that they do not make even a distant approximation towards the truth. It is known that physicians generally made it a rule not to report to the Board of Health the cases they had under treatment. As Dr. Tebault expresses it, they forbore to make the diagnosis, and only reported, in order to escape fines, such cases as threatened a fatal termination. The real aggregate of cases must have approached two thousand, or about five times the number reported by the Board of Health.

During the yellow fever season there was a damp atmos-

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phere, and a great deal of rain. The thermometric means range from 79° to 88° Fahrenheit.

Concurrently with the epidemic of yellow fever there was a very general and widespread epidemic of dengue in New Orleans. The New Orleans *Medical and Surgical Journal* estimates the number of cases at fifty thousand. The Board of Health estimate that one-half of the entire population of the city were afflicted by it, which would swell the number to about one hundred thousand cases. Six deaths are ascribed to it as being caused by the exhaustion consequent on protracted attacks.

The account which I have given of the epidemic in New Orleans is derived chiefly from the report of the Board of Health, and from the article of Dr. Tebault in the February number of the Richmond and Louisville *Medical Journal.*

THE EPIDEMIC IN MEMPHIS.

Yellow Fever was brought to Memphis in 1873 by the steam towboat Bee, which ran between New Orleans and St. Louis. She had been with her barges in New Orleans at the infected wharf of the Fourth District, in the same neighborhood with the Valparaiso and the Belle Lee. Three or four of her crew, including the captain, were taken sick with the fever during her trip up the river. She reached Memphis on the 10th of August, and remained there several hours. Two sick deck passengers were put ashore at the foot of Market street, in the neighborhood afterwards so famous in the annals of the epidemic as Happy Hollow. One of these, whose name is not known, staggered into a shanty near the wharf, occupied by an Irishman named Riley, and died there the next day. The name of the other man was W. W. Davis, who lived in Lauderdale county, Alabama. He passed the night in the Adams Street station-house, where he died the next morning. There were two deaths, therefore, on the 11th. The captain, C. B. Goll, remained on the boat and died the next night at Osceola, Arkansas, ninety miles above Memphis. His body was brought back to Memphis and shipped by ex-

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press to St. Louis. The infection did not spread from either Mr. Davis or Captain Goll, but proceeded first to make the conquest of Happy Hollow. It has been made a question, and it is one of considerable importance, whether the true source of the infection was the unknown unfortunate who died in Riley's cabin, or whether the germs of the pestilence emanated from the boat itself. It is to be regretted for many reasons, that the future history of the boat was not ascertained. Here, at any rate, at the foot of Market street, where was located Riley's cabin and the wharf at which the boat had landed, the epidemic first declared its malignant presence.

The first victim claimed from the population of the city, was a young man, name not given, who had rendered some humane assistance to the poor stranger who died at Riley's. Riley himself was then stricken down and soon died, but the date of his death is not given. As nearly always happens in the beginning of epidemics, the true nature of these first cases was not appreciated; and so unrecognized and utterly careless of recognition the dreadful malady began its work of desolation. Its progress at first was slow, but it never faltered in its march.

During some weeks its depredations were confined to Happy Hollow. "What in Memphis is called Happy Hollow is a very low, flat, area of about four acres, immediately on the river, near the northern limit of the city. It is under the Chickasaw Bluffs, so sunken that during high water it is largely submerged; but after the river has fallen it is left partially covered with stagnant ponds and slimy ooze, whose exhalations are noisome and offensive. Its soil is alluvial, and upon this garbage has been continuously thrown until it has become extremely filthy. It is the natural drain for the gutters of the over-hanging bluffs, through which sewerage steadily trickles. It is in addition, the home of a low class of Irish, and the favorite landing place of flats and rafts, whose occupants are proverbial for their carelessness and uncleanliness. During the hot summer months this accumulated mass of filth lies festering and rotting in the sun,

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exhaling mephitic gasses, and only needing the germs of yellow fever to be sown upon it to yield the fearful fruits of a great epidemic."—(*Dr. Erskine.*) I have no information of the number of persons inhabiting this locality; nor of the number of deaths occurring among them; nor of the rate of mortality.

By the first of September the disease had reached the top of the bluff, a distance of some three hundred yards from the point of departure. The height of the bluff is not stated in the accounts which I have read, but it must be something like one hundred feet. Having overleaped this barrier, the disease continued its onward march, moving slowly from house to house, and from square to square, until it occupied the northern third of the city.

It was declared epidemic on the 14th of September. Soon after this it set all boundaries at defiance and swept over the whole city. The wind seems to have had but little to do with its dissemination. It is described as having been fearfully infectious.

The temperature ranged from 75° to 85° Fahrenheit. There were several heavy rains during the prevalence of the epidemic, which had no perceptible effect upon the fever, certainly no favorable effect.

No measures of isolation were attempted. It is worthy of remark, however, that the jail, which was in the heart of the district which suffered most severely, escaped invasion until the 8th or 10th of October, when one of the prisoners, Fred Brooks by name, was attacked. He was removed to the Walthall Infirmary, where he died. Another case occurred shortly afterwards, which was treated in the jail and recovered. There were quite a number of cases of sickness in the jail which were regarded as dengue, all of whom recovered. The average number of prisoners was about one hundred and twenty-five. The sanitary condition of the institution received very careful attention. It was fumigated twice a day by burning coal tar; carbolic acid was freely used as a disinfectant; and it was thoroughly washed from top to bottom

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once or twice a week by means of water pipes laid for the purpose. It was surrounded by a wall fifteen feet high; and intercourse with the outside world was restrained within very narrow limits. It is to the high wall and non-intercourse that Dr. Erskine, who had charge of it, attributes its comparative exemption.

As soon as the epidemic was fully established, spasmodic efforts began to be made in the way of disinfection. But at this time there was no Board of Health, and everything was done without system and without intelligent direction. A Board of Health was finally organized on the 8th of October, after the fever had been raging for two months. Of this Board Dr. Erskine was President, and under his administration very energetic efforts were made to check the further progress of the pestilence. Carbolic acid was used in large quantities, and lime was scattered freely in the yards and gutters; but without any perceptible influence, either good or bad.

There was some dengue at first, and some malarial fever; but these milder maladies were soon swept away, and the more malignant disease took possession of the field, as is always the case in great epidemics. Dr. LeMonnier, in the New Orleans Medical Journal, undertakes to prove that the fever was of a mixed type—a hybrid monster, part yellow fever and part malarial fever. He is undoubtedly mistaken. First, because no such mixture of febrile types has ever been known to occur, or by possibility could occur. And secondly, because there is no such general prevalence of malarial fevers in Memphis as would be necessary to furnish the malarial part of the parentage in this unnatural conjugation. And thirdly, because the proof is overwhelming that the disease was unmitigated and unmistakable malignant yellow fever—yellow fever pure and simple, without admixture with anything else.

The first frost was on the 5th of November. New cases of the disease, with the usual percentage of deaths, continued to occur until the middle of December. Some of these, I am unable to state how many, were among returned refugees. This unusual persistence of the pestilence after there had been

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several times severe frost and ice, is one of the remarkable features of its history.

The population of Memphis at the advent of the epidemic may be stated at about 45,000. In the general exodus that ensued it is estimated that 20,000 persons sought safety in flight, leaving 25,000 at the mercy of the pestilence. The number of cases is roughly estimated at from 7,000 to 10,000. The mortality is stated by Dr. Eskine at 1,800. But I have seen a list of the deaths containing 2,000 names. Upon this basis the mortality is from 20 to 25 *per centum* of the cases.

There are some circumstances connected with this Memphis epidemic, not of a medical character, which are worthy of mention even in this brief account of it.

When the stricken city found herself in the dreadful embrace of the pestilence, she was obliged to send abroad an appeal for help. To this appeal the whole country, from Maine to California, and from the rice fields and palmetto groves of South Carolina to the pine forests and frozen lakes of the North-west, responded in most liberal contributions of money and supplies. The subjoined table will show the amounts received by the various Associations which were engaged in the relief of the sick, and also the amounts left on hand at the close of the pestilence:

ASSOCIATIONS.	RECEIVED.	REMAINING.
Howard Association	$124,245	$46,919
Masonic Relief	32,926	16,699
Odd Fellows' Relief	46,606	30,982
German Relief	8,576	1,108
Citizens' Relief	91,713	11,506
Fire Relief	5,548	3,121
Shoulder to Shoulder	2,501	141
Police Relief	12,875	7,426
Knights of Pythias	6,579	1,949
Totals	$331,589	$119,848

From this it will be seen that large as was the demand for assistance, the contributions made were still larger, showing an aggregate net excess of 120,000 dollars—more than one-third of the aggregate sum of the contributions.

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For information respecting the epidemic in Memphis, I have relied almost entirely on the published reports of Dr. Erskine, who was President of the Memphis Board of Health, and upon private letters which he has been kind enough to write in reply to my inquiries.

THE EPIDEMIC IN SHREVEPORT.

For the facts in connection with the Epidemic in Shreveport in 1873 I am obliged to depend entirely on two reports: 1st, the Report of Drs. A. B. Snell, D. P. Fenner, and J. F. Davis, made to the Shreveport Medical Society and published by the Howard Association; 2d, the Report of Dr. Henry Smith to the Louisiana Equitable Life Insurance Company of New Orleans.

These reports are both extremely defective in all that relates to the introduction of the disease into the City of Shreveport. According to Dr. Smith, it broke out almost simultaneously in three separate localities, namely: on Texas street in the center of the city near where the Transatlantic Circus was quartered; in a Levee street boarding house; and at a point near the river two miles below the city; but th dates of its appearance in these several localities are no given. A little further on he states that the first case, whicl he considers as a doubtful one, although it terminated ir death, occurred on the 18th of August; and that a second case, certainly genuine yellow fever, occurred on the 22d of August. The result of this last case is not given; and I can only conjecture that this also terminated fatally; and that the dates given mark the periods of the death of, and not the beginnings of, the cases.

The Report of the Committee of the Shreveport Medical Society states that the first case occurred in the person of Newton Walker. It is not quite certain that his case was really one of yellow fever, but the circumstantial evidence that it was so is nearly conclusive. He was engaged in his store, on the Levee at the corner of Crockett street, every day in settling up his business affairs, and took his meals at

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an eating house which was patronized by steamboatmen. He took sick on the 12th of August, and went to the house of his brother near Bayou Pierre, three miles below the city. He was not seen by a physician during the febrile stage of his malady, but was subsequently treated for "yellow jaundice." The real nature of his attack was not suspected until several members of his brother's family were taken sick with yellow fever, of which five of them died. There was no way to trace the infection in these cases except through Newton Walker. It is not stated whether the fever was propagated from this stricken family to other families in the neighborhood. And it is to be specially remarked that while Newton Walker is supposed to have contracted the disease inside of the city, he passed through its various stages three miles below the city. It is also to be specially remarked that there is no intimation in either of these reports that the epidemic within the city limits proper was derived in any way from this suburban outbreak.

I suppose that this is the first of the three localities mentioned by Dr. Smith, although the distance below the city is stated by him at two miles instead of three. It was in this neighborhood that a steamboat had sunk with a considerable number of cattle on board, which were drowned. They were afterwards dragged ashore and skinned, and their carcasses left to rot in the open air.

By the 25th of August, we are told, the number of cases had so greatly increased that the physicians found themselves overwhelmed with calls. We are also told that the disease was at this time mostly confined to public boarding houses which were frequented by river men. The fever now spread in the central portion of the city with great rapidity, and was epidemic on the first of September. The number of cases and of deaths continued to increase from day to day until the middle of September, by which time the pestilence had swept over the whole city. After this there was little variation in the death rate until the 20th of October, when there was a mild frost. A few days later, namely, on the 28th and

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29th, there was heavy frost and ice, and the grasp of the enemy was felt at once to relax.

At the first alarm a large number of the inhabitants left; and many others a little later, seeing the dreadful mortality of the pestilence, fled panic-stricken. Of these a considerable proportion went away with the germs of the malady in their systems, and were stricken down in their several places of refuge. It is said that more than half the cases attacked in this way died; and that in many instances they spread the infection to persons about them, so as in some cases to develop destructive epidemics—as for example in Calvert and in Marshall.

The population of Shreveport was about ten thousand. It is estimated that more than half of these left during the exodus which has been described, so that only about four thousand five hundred persons, black and white, remained in the city. The number of cases is estimated at three thousand. The number of deaths was seven hundred and fifty-nine. The blacks were attacked almost as generally as the whites, but the mortality amongst them was very much less—six hundred and thirty-nine whites dying, and one hundred and twenty blacks; the color of the remaining cases not being mentioned. The ratio of deaths to cases was about twenty-five *per centum*.

The type of the fever was intensely malignant and infectious. The average period of incubation seemed to be about seven days; but in some it was as short as three days, and in some as long as three weeks.

The scanty detail of facts, as I have given them, leaves the origin of the epidemic enveloped in some doubt. Much stress has been laid on the filthy and unsanitary condition of the city on account of defective drainage and neglect of scavengering. But this unsanitary condition of the city has existed for many years which have not been marked with epidemics. Besides, while defective drainage and filth may render yellow fever more malignant, it is well known that they will not of themselves produce it. It was very widely asserted at the

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beginning of the epidemic, that it had been brought by a traveling circus company from Mexico across the State of Texas. But it was shown afterwards that the circus people contracted the disease at Shreveport, instead of bringing it with them. Another favorite theory was, that it was caused by the removal of the famous Red River raft; but the following statement is a sufficient refutation of this theory: It is a fact, that from fifty to one hundred men were constantly employed during the season in clearing out the raft, and that not a single case of yellow fever occurred amongst them.

From the fact that the first cases all seem to have occurred among persons who were in the habit of associating with steamboat and river men, and that even after the disease had made considerable progress, it was still mostly confined to boarding houses frequented by steamboat men and river men, I think it is perfectly legitimate to conclude, that the infection was brought in some way up the river from New Orleans.

The only notable peculiarity of the season meteorologically is, that it was more than usually damp—the air more than usually humid.

THE EPIDEMIC IN PENSACOLA.

The yellow fever in Pensacola, in 1873, seems to be clearly traceable to the ship Golden Dream. This vessel reached the harbor of Pensacola on the 10th of June. She had lost three of her crew at Havana, and eight more while at sea. She was therefore placed in quarantine, cleaned, fumigated, and whitewashed, and detained for twenty-four days before she was allowed to approach the city. She was anchored about five hundred yards from the central wharf. This brings us to the 3d of July. A month elapsed without any event of importance, when a sailor who had been eight days on board the Golden Dream was taken sick with the fever on the 2d day of August. He died with black vomit on the 5th. The Golden Dream sailed on the 16th of August, and was lost at sea on the 30th, in consequence, it is said, of "getting short of hands," her crew having been stricken down by the pestilence.

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The first three cases that occurred within the city were all attacked on the same day, namely, the 6th of August, and in the same house, the residence of Mr. W. McKinzie Orthing, Deputy Harbor Master, on Romana street, two squares distant from the water's edge. On the next day, the 7th, four other cases occurred on Romana street, near Mr. Orthing's house. The first death in the city was that of Mrs. Nasite, who arrived in Pensacola from New Orleans on the 22d of July, was taken sick two weeks after, namely, on the 7th of August, and died on the 13th. Between the 7th and the 14th several stevedores who had been employed on the infected vessel contracted the fever, and communicated it to their families, thus establishing almost at the same time several different centers of infection.

It will have been remarked that the first eight or ten cases in the city had no direct communication with the Golden Dream. How, then, did they become infected? Mr. Orthing had visited the vessel repeatedly, but, while the inmates of his house were stricken down, he himself escaped. He might have brought the poison with him in his clothing, even as Dr. McDonald, the author of the article on Yellow Fever in Reynolds' Practice, tells us that he often trembled to think that his monkey jacket might become a vehicle of infection. But the more probable opinion seems to be, that it was in the wings of the invisible swift winds that the seeds of the pestilence found agents of transportation. We are told that the wind, from the 28th of July until after the fever became epidemic, blew steadily every day, between the hours of five and ten P. M., from the south-west, sweeping first over the infected ship, and then over that portion of the city in which these cases made their appearance, the distance to be traversed being about half a mile. We are also told that the disease spread rapidly for more than a mile towards the north-east, the direction traveled by the wind, along a narrow belt about one square in width; and that it was confined almost exclusively to this belt for some ten days. Afterwards it spread all over the city.

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The atmosphere was damp and humid, even in the absence of clouds. There were but three entirely fair days in June, ten in July, and twelve in August. The rain was abundant, and fell in torrents. The mean temperature for June was 78° Fah., for July 80°, for August 81°. Electricity negative; ozone altogether absent.

The population was reduced by stampede to about three thousand, of whom about one thousand were liable to the disease. The number of cases is estimated at six hundred. The number of deaths was sixty-one—ten *per centum*. As usual, the whites suffered most severely; but the blacks were not entirely exempt. There was no dengue. Disinfection, as a means of prophylaxis, was not attempted. I am indebted to Dr. Hargis, of Pensacola, for most of the facts given in this sketch.

THE EPIDEMIC IN MONTGOMERY.

After an interval of exemption of eighteen years, Montgomery was called to suffer from another visitation of yellow fever in 1873. It is believed that the disease was brought from Pensacola by a white woman named Mollie Jackson, and by Mr. D. H. Cram, President of the Pensacola and Louisville Railroad.

Mollie Jackson had been living in Pensacola opposite the hospital. It has been stated in the account of the epidemic in Pensacola, that yellow fever had made its appearance there in three cases on the 6th of August, and in four cases on the 7th, and that it had traveled in the direction of the wind with extraordinary rapidity. Mollie Jackson left Pensacola on the 9th, and had therefore been sufficiently exposed to the infectious influence. She arrived in Montgomery on the 10th, sickened on the 17th, and died on the 26th. During the first four days of her illness, she was seen by a physician who did not suspect that he had a case of yellow fever. The fever subsided, and the physician saw her no more; but notwithstanding her apparent recovery, she relapsed in a few days and died. The extreme yellowness of the dead body, together

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with information derived from the nurses, afterwards satisfied the physician in question that it was really a case of specific yellow fever. One of the nurses went to West Point, Georgia, was very ill with fever, and is stated to have thrown up blood from the stomach.

From the house, situated near the intersection of Clay and Dickerson streets, in the First Ward, in which Mollie Jackson died, as a focus of infection, the fever spread through the surrounding neighborhood. Almost every house in the three adjoining blocks was invaded, and death after death by black vomit proclaimed the character of the malady.

Mr. Cram's residence was at the corner of McDonough and Madison streets, in the Fifth Ward. He left Pensacola on the 14th day of August and reached Montgomery on the 15th. His office in Pensacola was in the infected region. He got sick somewhere between the 17th and the 20th with a fever which lasted several days. Its character does not seem to have been accurately determined; but on account of his Pensacola exposure, and of subsequent events in his neighborhood it is presumed to have been yellow fever. Here at any rate was in some way established a new focus of infection The husband of Mr. Cram's nurse died soon after in the same yard of yellow fever—date of death not given. On the 4th of September the house next to Mr. Cram's on Madison street, which was occupied by Germans, was invaded, and up to the 25th five deaths had occurred in it. Next to Mr. Cram's on McDonough street, is a row of brick buildings, not one of which escaped.

For some two or three weeks the disease was confined to the two neighborhoods that have been mentioned; but ultimately it extended all over the city. The white population. fled in dismay until not more than eighteen hundred remained in the stricken city. Of these it is believed that nearly five hundred had the fever. A considerable number of negroes were also attacked, enough probably to swell the aggregate of cases to full five hundred or more. There were one hundred and two deaths—eighty reported by the Board of Health and

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twenty-two derived from other sources of information. The mortality, therefore, was about twenty *per centum* of the cases.

The disease was of a milder type among the negroes than among the whites, and very few of them died. Twelve deaths are accredited to Ward One, and sixty to Ward Five; leaving thirty scattered over the rest of the city.

Before the arrival of the fever some measures of disinfection had been practiced with a view to the prevention of cholera, such as the use of lime in gutters and foul places, and the use of carbolic acid in the vaults of privies, and the city was considered to be in a good sanitary condition. While the fever was in progress large quantities of coal tar were burnt in the streets, but the fumes evolved exhibited no power to check the march of the pestilence.

I have obtained the information which I have detailed in this account of the Epidemic in Montgomery chiefly from the Report of Dr. R. F. Michel, which was published in the January number of the Charleston Medical Journal.

THE EPIDEMIC IN CALVERT.

On the 3d of September, a young man by the name of Hughes arrived in Calvert fleeing from yellow fever in Shreveport. He had been in business there as a clerk, and the fever had been prevailing for some time before he left. He was taken sick at the Haynes House on the night of the 5th of September, presented all the symptoms of malignant yellow fever, and died on the 10th. On the night of the 10th the clerk of the Haynes House, who had waited on Hughes, began to complain and had a mild attack of fever, from which he recovered in a few days. But subsequently he relapsed and died of black vomit—date of death not stated. The disease now begun to spread through the village. Mrs. Haynes, the proprietor of the hotel, was taken sick on the 23d and died with black vomit on the 27th. Dr. Coleman, who had treated the cases at the Haynes House, was attacked on the 28th. He recovered, but the disease spread through his family to the extent of six cases.

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The bedding on which Hughes died was thrown upon the roof of a little house at the foot of Main street, and left there exposed to wind and weather for three weeks, the prevailing wind in the meantime blowing almost directly up the street and scattering the poison over the town. By the 20th of October the pestilence became general.

The town contained a white population of about fifteen hundred. Only a little over six hundred of these remained during the prevalence of the fever, and among this devoted six hundred there occurred at least four hundred and fifty cases and one hundred and twenty-five deaths—a mortality of about twenty-eight *per centum*.

It is stated that an unusually large number of relapses occurred here, some as long as six weeks after the first attack, and many of them fatal. A considerable number of pregnant females had the fever, but not one of them miscarried or died. It was remarked, that the pulse during convalescence, and even weeks after the recovery, was greatly increased in rapidity—varying from ninety to a hundred and twenty per minute.

The first frost was near the end of October. It seemed to have no effect whatever on the progress of the epidemic. The material was indeed nearly consumed, but fifteen cases subsequently occurred, eight of them among returned refugees and new comers. There were several frosts in November, but these also seemed not to lessen the virulence of the infection. The last case, a returned refugee, was taken sick on the 20th of December, and died on the 29th.

From Calvert the disease was transported to several places in the adjacent country. In at least three of these it spread to the extent of three or four cases in each place—most of them fatal. A gentleman and his family fleeing from the infected town, passed the first night with a relative at Owensville, twelve miles distant. They went on the next day, borrowing a blanket and a shawl for one of their children which had fallen sick. One day later these articles were returned. Within a few days three cases of yellow fever occurred in

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the family, and two of them died with black vomit. They had no other communication with any infected place.

No disinfection was attempted in Calvert until the 1st of December, when the houses that had been closed were opened for ventillation, and carbolic acid scattered in the rooms with a view to the destruction of the lurking germs of the pestilence.

This account has been condensed from that given by Dr. Coleman in the March number of the New Orleans Medical Journal.

THE EPIDEMIC AT GREENWOOD.

The principal interest of the little outbreak of yellow fever in the neighborhood of Greenwood is in connection with its occurrence in the family of Dr. F., a wealthy planter living four miles east of the town. This family consisted of Dr. F., aged 76 years; Captain F., his son, aged 48 years; nine children of Captain F., aged from 8 to 25 years; and several colored servants. Two of the sons had been employed in Shreveport, where the fever was at the time epidemic. These two young men, Harris and Voss, aged respectively 22 years and 19 years, came home on the 28th of September, seemingly in good health, and without baggage. The next day Harris was taken sick; and on the day following Voss also sickened. Voss recovered in two days, the nature of his sickness not having been determined; but Harris had all the symptoms of yellow fever, and died on the 3rd of October with black vomit and suppression of urine. The mattress on which he had lain was exposed to the air for some thirty-six hours, during which time a slight shower of rain fell upon it. It was returned to the room about the 5th, and used as a bed by other members of the family. The blankets and sheets were washed by a colored servant and replaced on the same bed. The servant fell sick in a day or two after the washing, and died on the 11th. She had not been about Harris during his illness, and could have contracted the disease only from the clothing which she had washed. The room in which

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Harris died was used during the day by all the family, and at night by Voss and Robert as a bed-room. On the 9th or 10th sickness again appeared in the household; and on the 13th Dr. G. N. Riggins was called in. He found four cases of yellow fever, namely: Robert, aged 25 years, Voss, aged 19, Lucien, aged 13, and Kelso, aged 10. They were all mild attacks except one. Robert had black vomit, but recovered.

On the 15th Dr. F., the grandfather, was taken sick with the fever. He slept in a detached building distant about twenty feet from his son's house; but he had been with his grandsons during their sickness, and had allowed one of the sick children to share his bed. He died on the 29th of the month.

About the 10th of October, Captain F. returned home after an absence of five days, during which he had received a gunshot wound of the shoulder which confined him to his bed. He slept in a room at the opposite side of the hall from the room in which Harris had died. The hall was ten feet wide. Some of the children suffering from yellow fever occupied a bed in the same room with the Captain. He took the disease on the 19th and died of it on the 23rd.

In addition to these cases a colored boy who had waited on Dr. F., and who had washed some clothing on which urine and fœces had been passed, was taken ill with the fever about the 20th. He recovered. Four of the children escaped infection, as did also the neighbors who visited the family during their affliction. There was no local cause to account for the sickness.

Nine other cases occurred in and around the town in the persons of refugees from Shreveport; but no infection either of persons or of localities resulted from any of these. Free ventilation was the only prophylactic measure employed.

These details are gathered from a communication to the New Orleans Medical Journal by Dr. M. F. Leary, U. S. A., Post Surgeon at Greenwood.

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THE EPIDEMIC IN MOBILE.

The first case of yellow fever in Mobile in 1873 was that of Owen McKenna. He was employed in the workshops of the Mobile and New Orleans Railroad; went to New Orleans on the 16th of August; returned to Mobile on the 17th; was taken sick on the 21st; and died with black vomit on the 26th, at the house of Mr. Casey, on the east side of Hamilton street, between Palmetto and Charleston. An interval of five weeks elapsed before any other cases occurred in this vicinity. On the 6th of October, Dr. F. M. Stone died near the corner of Franklin and Charleston, one block east of Mr. Casey's; and subsequently a few additional cases occurred in this section of the city, but at a distance of several squares. I am not able to say whether the infection in these cases was derived from Owen McKenna, or from some other source.

The second case in the city was that of Edward Dixon. This man had been employed in the neighborhood of Shreveport, and spent some hours in that city on his way to Mobile. He passed through New Orleans without detention, and arrived in Mobile on the 10th of September. He was already sick, but went that same evening across the bay. He returned to the city the next morning, September 11th. He was now very sick, and was found under an old shed near the wharf by Policeman Dougherty, who, by direction of the City Physician, took him to the City Hospital, where he died on the 13th of unmistakable and malignant yellow fever. It was from this case that the epidemic was engendered. In order that its dissemination may be easily understood it is necessary to premise a few topographical details.

The City Hospital, the focus of infection, is just one mile from the river in the north-west quarter of the city. The streets here that are parallel with the river run very nearly from north-west to south-east. Of this range of streets we shall have occasion to mention Wilkerson, Jefferson, and Broad, the last being the most remote from the river of the three. Other streets cross these at right angles, running from

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the river to Broad street and beyond, and consequently pursuing a direction nearly from north-east to south-west. Of these we shall have occasion to mention St. Antony, Congress, and Adams. The City Hospital lies between Broad and Jefferson, on the north-east side of St. Antony. To the north-east of the City Hospital and separated from it by a high brick wall is the jail, which also lies between Broad and Jefferson, fronting on Congress. In the same range, south-west of the City Hospital, on the opposite side of St. Antony street, is Providence Infirmary. On the same side of St. Antony street as the City Hospital, separated from it by Jefferson street, and so lying one square nearer to the river, is the Marine Hospital. Each of these institutions occupies an entire square. Across Broad street, just beyond the City Hospital and the jail, are several squares that are very nearly vacant. Sweeping past the south-west corner of Providence Infirmary, in a direction a little north of west, is the Spring Hill Road. A few hundred feet further towards the south, and very nearly parallel with the Spring Hill Road, is the Spring Hill Shell Road. To reach the Spring Hill Road from the City Hospital by the shortest route it is necessary to cross one square in a diagonal direction. To reach the Shell Road two squares must be crossed diagonally. Passing down Broad street towards the south-east, we come, at the distance of eight squares, to Canal street. Here Broad street changes its direction, and runs almost directly to the south, bearing however slightly to the west. The next street after crossing Canal is Palmetto—which is thus nine squares from the City Hospital. Next west of Broad in this part of its course, and parallel with it, is Marine street.

The infection confined itself chiefly to a narrow belt extending from north to south, almost along Broad street, with the City Hospital near its northern extremity, and Palmetto street near its southern boundary. Along this belt there were established three special yellow fever centres—the first at the City Hospital, the second beyond Broad street, on the Spring

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Hill Road and the Shell Road, the third also beyond Broad, and about the intersection of Palmetto and Marine.

As we have already seen, the disease was carried to the City Hospital by Edward Dixon, who died there on the 13th of September. Nine other cases occurred in the Hospital, making ten in all, with five deaths. One of these was Sister Xavier.

The second case in this neighborhood was that of Sister Regina, who was taken sick on the 15th of September, and died on the 18th, in the Providence Infirmary. Altogether four cases originated in this Infirmary, with three deaths. Seven cases are reported as having occurred in the Marine Hospital, with one death. In the immediate neighborhood there occurred several additional cases, with several deaths—exact number not ascertained. Throughout this neighborhood carbolic acid was abundantly used as a prophylactic, commencing with the earliest cases; but it most signally failed, either to check the progress of the malady, or to modify its type.

Passing along the infected belt towards the north-west, we find that the jail escaped infection altogether. Not a single decided case occurred within its walls during the season. There was one doubtful case in the person of the Jailor, Mr. J. E. Collins, who had a mild attack of some sort of fever, commencing November 2d. It is stated that this institution has always enjoyed a similar immunity during all previous epidemics. It is surrounded by a high brick wall, and necessarily has but little communication with the rest of the city. There were a few cases still further north than the jail, but they require no special mention.

In the infected neighborhood lying beyond Broad street and along the Spring Hill Road and the Shell Road, a few hundred yards South of the City Hospital, there occurred a larger number of cases than in any other part of the city. Here, on the Spring Hill Road, cases occurred as early as the 23d of September, and on the Shell Road as early as the 25th, the epidemic traveling slowly south and west. Amongst other

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cases in this neighborhood were those of Policeman Dougherty and his son. Dougherty, it will be remembered, was the policeman who assisted Edward Dixon to the hospital. Carbolic acid was freely and repeatedly used in this neighborhood also, but, as in the case of the hospital and its vicinity, it failed utterly, either to check the progress of the malady, or to modify its type. The fever pursued the even tenor of its way until a mightier disinfectant than carbolic acid lent its aid, namely, frost. And even after frost several cases, and several deaths among returned refugees whose residences were in this part of the city, showed that the poison still lingered in its chosen haunts.

Taking now a great leap to the south, and passing over some six squares with only an occasional case to mark its transit, the disease made its appearance on the 1st of October on Palmetto street, near Marine, the third of the infected neighborhoods which I have indicated in this belt. The first case here was John McCann, who sickened on the 28th of September, and died on the 1st day of October. He is said to have been much about the City Hospital, where he may have contracted the disease. On the 17th and 18th of October, four other members of the McCann family were stricken down—father, mother, and two children. The mother and one child died, both on the 21st. Eight or ten additional cases occurred in this immediate neighborhood, with several additional deaths. Here again carbolic acid disinfection was used with lavish profusion, and here also it proved to be utterly destitute of prophylactic virtue.

Ten cases, with five deaths, occurred outside of the city limits, in the western suburbs about three miles from the river, in the neighborhood of Smith's dumping ground—a place of most unfragrant reputation, where dead animals and the contents of privy vaults are transformed into commercial fertilizers. The atmosphere of this place is said to have been very offensive at the time; and whether from this cause or some other, the cases occurring here were exceedingly malignant, as the rate of mortality, 50 *per centum*, sufficiently shows.

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People living in this neighborhood were obliged to pass through the Broad street belt to get to the city, and it is probable that these cases originated in this way. Or it may be that the excretions of yellow fever patients were conveyed in privy filth to the dumping ground. Mrs. Smith was the first victim.

As far as I have been able to learn, there was but one case among our negro population—the case, namely, of Maria Wheeler, who died on the 17th of November.

In compiling the statistics of epidemics, it is always impossible to ascertain exactly either the number of cases or of deaths. But I have taken much trouble to get at the truth as nearly as possible in regard to both of these points in our recent visitation of yellow fever; and I am satisfied that my information is far more accurate than is usually obtained in such cases. I have been able to collect reports of two hundred cases and thirty deaths occurring in the city; and of ten cases and five deaths occurring in the suburbs. The ratio of mortality to cases in the city is, therefore, fifteen *per centum*.

I have reports of fifty-two cases occurring in forty-six houses which were not disinfected, so that in forty separate houses where there was no disinfection no second case presented itself—a most effective reply to the argument that because carbolic acid may have been used in a house without the occurrence of a second case, that therefore the subsequent exemption was due to the carbolic acid.

Of the two hundred cases reported, the source of infection was traced in one hundred and thirty, and always, directly or indirectly to Edward Dixon. Twelve cases, with three or four deaths among them, are reported as occurring after frost.

I append a meteorological table for the year. It presents nothing specially remarkable. We had heavy rains in August, and local thunder storms almost every day, with an aggregate of sixteen inches of rain. Maximum thermometer 94°, minimum 70°, mean 80°.26′; prevailing wind, south. In September rains and thunderstorms continued to be frequent, rain sixteen inches. Maximum thermometer 91°, minimum 61°,

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mean 76°.16′; prevailing wind from the north-east. In October, rain five inches; maximum thermometer 87°, minimum 34°, mean 65°.22′; prevailing wind from the north; first noticeable frost on the 26th.

Along with our epidemic of yellow fever we had a much more extensive epidemic of dengue. I am not able to make even an approximate estimate of the number of cases; there were no deaths.

In consequence of the epidemic there was complete prostration of business, and from eight thousand to ten thousand of our people went away to escape the infection. The excitement was out of all proportion to the danger. All of the most populous parts of the city escaped with comparative impunity. Inside of the infected neighborhoods there was indeed considerable danger; but outside of the infected neighborhoods the danger was very slight. I sincerely believe that our commerce ought not to have suffered interruption; and that strangers could have visited with perfect safety, and at any time during the season, any of the business parts of the city. Because yellow fever prevailed about the City Hospital, and in a narrow belt beyond Broad street, a mile or more from the river, it does not follow that pestilence was lying in ambush among the dry goods and grocery houses of Water and Commerce streets, and the hotels and restaurants of Royal. A few strangers did venture into the city during the reign of the epidemic, and I have not learned that any of them suffered on account of their temerity.

A quasi quarantine was established against the West Indies, New Orleans, and Pensacola. But it was not put into operation until the disease which it was intended to exclude had already entered the city. It was moreover of such imperfect character that it was easily evaded, and in point of fact was evaded repeatedly. It is therefore unnecessary for any purpose I have in view to give any detailed account of it. If, however, I were writing a history of municipal folly it would be worthy of special mention.

The account which I have given of this epidemic of yellow

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fever in Mobile has been prepared partly from my own knowledge of the facts, and partly from information furnished me by several of our leading physicians in written reports of their own practice. I am aware that it differs very widely from the report of our Advisory Board of Health; but not for that reason is it any the less worthy of confidence. Doubtless the Board of Health did the best they could under the circumstances; but circumstances were singularly unfavorable to them, inasmuch as most of our physicians persistently refused to report to them, or to recognize them in any other light than as public nuisances.

THE REPORT OF THE ADVISORY BOARD OF HEALTH.

But it is necessary that I should be a little more explicit concerning the report of the Advisory Board of Health, or rather, the report of the Medical Officer of that Board.

This report bears date the 1st day of November, 1873, and was published under the auspices of the Board in the Daily Register, newspaper, of the 27th of the same month. The material portions of it had been communicated to the American Public Health Association, at its session in New York, on the 12th of November, and is to be published in the Transactions of that body. It is, moreover, the only official account of our late epidemic which has been given to the world, and will naturally be made use of by medical historians and statisticians. In the interests of historical and scientific accuracy, therefore, it becomes important that its mistakes should be corrected and its deficiencies supplied.

I quote *verbatim* the summary of cases and deaths:

"The total number of cases treated in the city, as officially reported, is as follows: Sixteen cases occurred in the hospitals, of which number seven died and nine recovered. Outside of the hospitals there were twenty-two cases, of which number twelve died and ten recovered. Total number of cases in the city, forty; total number of deaths, nineteen; and of recoveries, twenty-one."

These statements may be in entire harmony with the re-

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ports made officially to the Board of Health, because, as I have said, the medical profession of the city refused to make reports to the Board of Health. But they are certainly very wide of the mark as to the real facts of the epidemic, and so are false and misleading.

Not sixteen cases, but twenty-one cases, occurred in the hospitals; and the deaths in the hospitals numbered eight at least, instead of seven.

Instead of twenty-two cases with twelve deaths, at least one hundred and seventy-nine cases were treated in the city outside the hospitals, with twenty deaths certainly, and perhaps one or two more. For I happen to know that some yellow fever deaths were assigned to other causes of dissolution; and I know also what sort of influences were sometimes used to determine the character of the certificate of death.

Sixteen cases inside of the hospitals, plus twenty-two cases outside of those institutions, would make, according to the ordinary principles of addition, an aggregate of thirty-eight cases. But the arithmetician of the Advisory Board makes out of these addends a sum equal to forty; and forty therefore let it be. Of these forty cases they tell us that twenty-one recovered, and that nineteen died; a dreadful percentage of mortality indeed. I have shown, however, that instead of an aggregate of forty cases in Mobile during the season there was really five times that number, namely, two hundred cases; and that instead of nineteen deaths we had thirty, making the percentage of mortality fifteen, instead of forty-seven and a half.

Now, it is true that the report of the Advisory Board of Health bears the date of November the 1st, although it was not published until November 27th; and that a certain number of the cases and deaths included in my statistics occurred after the first of these dates; but the epidemic was then so nearly over that corrections made with reference to this fact would afford but little help to the Board, except in the single item of the number of deaths.

The conclusion of the report is of the nature of an apology,

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for carbolic acid disinfection; and an assertion, without proof of its prophylactic value.

Every step of the argument, if that may be called argument which is really no argument at all, is disingeneous and sophistical. No attempt is made to arrange the facts connected with the disinfection of the various localities which were treated with carbolic acid so as to show their bearing on the questions at issue; but we are told in general terms that Mobile and New Orleans used carbolic acid with persistence and assiduity, and escaped any general epidemic; and that Memphis and Shreveport and Pensacola did not invoke the prophylactic agency of carbolic acid and suffered frightfully; and from these premises, by some logical legerdemain which passes my comprehension, the conclusion is drawn, that, *therefore*, carbolic acid disinfection arrests the progress of yellow fever. Now, in the first place, the premises are false; and in the second place, even if they were true they furnish no logical warrant for the conclusion which is drawn from them.

With how much accuracy this Report has been prepared, may be further judged of when I call attention to one little fact of omission. The streets and grounds about the City Hospital were most elaborately disinfected. The air of the whole region was kept reeking for weeks with the foul fumes of carbolic acid, the frogs were killed in the gutters, and the grass was scorched and blasted as if the hot breath of the sirocco had fallen upon it. And yet this Report affords not the slightest intimation that any disinfection at all was practised there.

But what were the real results of the disinfection? What did the carbolic acid accomplish? The answer is short and easy, if not very elegant and refined. It made a great stink, and it did nothing else. It did not check the disease in the City Hospital. It did not prevent its migration across St. Anthony street to the Providence Infirmary. It did not keep it away from Mr. Thompson's in the acute angle between Broad street and the Spring Hill Road. It did not check its

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march on the Spring Hill Road along which it traveled steadily from house to house until it passed beyond Pine street, and was met by the frost. It did not interfere with its passage from the Spring Hill Road to the Shell Road, nor with its dissemination along that thoroughfare. It did not fence it out of the McCann neighborhood, nor check its ravages after it got there. In one word, seriously and deliberately spoken, it utterly failed to accomplish any good whatever; and this is the verdict of every medical man in Mobile of whose opinion I have any knowledge. Whether it was equally impotent for evil is not so easily settled.

If we accept the statistics of the advocates of carbolic acid disinfection as at all reliable, the ratio of the mortality to the cases where carbolic acid has been used is truly appalling. Look at the terrible items as given by the Boards of Health of Mobile and New Orleans.

In New Orleans in 1871 the mortality was forty-seven and a half *per centum* of the cases.

In New Orleans in 1872 the mortality was forty-seven *per centum* of the cases.

In New Orleans in 1873 the mortality was fifty-eight *per centum* of the cases.

In Mobile in 1873 the mortality was forty-seven and a half *per centum* of the cases.

No such tremendous mortality was ever heard of before, even in the most malignant epidemics. The whole world has been filled with horror in view of the malignant energy of the epidemic in Memphis and Shreveport; and the harvest of death which the pestilence has reaped in those stricken cities has been regarded everywhere as of almost unprecedented and exceptional character. And yet in these cities the ratio of deaths to cases reached only about one-half of the number which it reached in Mobile and New Orleans—*twenty per centum* in Memphis against forty-seven *per centum* in Mobile; twenty-five *per centum* in Shreveport againt fifty-eight *per centum* in New Orleans.

In the progress of my study of the epidemic these contrasts

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filled me with amazement; and I could find no probable explanation until the horrible suspicion flashed upon me that peradventure this unprecedented mortality was the result of the disinfection which had been invoked for the purpose of opposing the progress of the pestilence.

But when I saw the Report of the Mobile Advisory Board of Health and how utterly worthless were the statistics with which they deluded the public; and when, with this hint to guide me I extended my inquiries with a view of ascertaining the character of the statistics of the New Orleans Board of Health, and found that these also were entirely unreliable; then indeed I saw reason to believe that an other explanation was possible; and that carbolic acid after all was not so destructive of yellow fever patients as I had supposed.

But while I am now satisfied that carbolic acid disinfection has not been the wholesale agent of destruction which the testimony of its friends seemed to prove it to be, I am very far from believing that it is entirely innocent and innocuous.

Not to go more deeply into the question, the smell of it is very offensive; and it is very easy for any one who understands the great danger of emesis in yellow fever, and the extreme sensitiveness of the stomachs of yellow fever patients, to understand also how the inhalation of an atmosphere loaded with the fumes of carbolic acid might turn the scales in doubtful cases.

The discussion of the Theory and Practice of Disinfection will be resumed in another part of this treatise. In the meantime I conclude what I have to say about the Epidemic in Mobile with a few statements furnished by several of our physicians.

SUPPLEMENTAL.

By Dr. E. P. Gaines. "The first case I had was in the family of Mr. Thompson, who lived on the Spring Hill Road, about eighty yards west of the City Hospital. This was on the 23d of September. Before the end of the season every member of this family, some nine in number, had the disease. I did not observe that disinfection with carbolic acid did any

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good. The fever spread steadily from house to house where it was most freely used. It was freely used at Mr. Thompson's; but the fever continued to recur in his family, and spread thence to Mr. Henry Turner's; then to Mr. Carver's; to Mr. A. J. Moore's; to Mr. Acker's; to Mr. Cieutat's. All of these places are on the Spring Hill Road, and all as they were successively invaded by the fever were disinfected with carbolic acid. Mr. Cieutat lived in the second house west of Pine street. His son died on the twenty-fifth of October. I did not hear of the fever spreading beyond this house; but I heard of two cases on the opposite side of the street. On the Shell Road the fever invaded the house of Mr. Merritt, near Pine street, Mrs. Merritt dying on the 25th of September. The premises were disinfected with carbolic acid, but the fever spread from there to Mr. J. W. Moore's about sixty yards west, where four cases occurred; and then to Mr. Julian's, whose place adjoins Mr. Moore's. The fever also passed from Mr. Merritt's to Mr. Whitfield Turner's, the next house to the east, where Mr. Dave Turner died with black vomit on the 14th of October. In all of these places carbolic acid was freely used."

By Dr. C. M. France. "On the first day of October, my first patient in the McCann family, living on Palmetto street near Marine, died. That same afternoon Dr. Hicklin, acting as Assistant Health Officer, had the sidewalk in front of the premises, the lot both front and back, as well as the house itself, disinfected with carbolic acid. It was applied so freely as to kill all the grass and vegetation which it touched. And yet in a few days another case of fever occurred in an adjoining yard, and proved fatal. The fumes of the acid were very disagreeable in the daytime, and almost insufferable at night, and continued so for weeks. In sixteen days after it was first used, four additional cases, of a most malignant type, occurred in the McCann family, of whom two died, and the other two barely recovered. At the same time other persons in the immediate vicinity were attacked with the disease, and some of them died. So far as I had opportunities for obser-

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vation, carbolic acid was absolutely worthless as a prophylactic agent."

By Dr. E. H. Fournier. "I am desirous of having appended to your history of the Yellow Fever Epidemic of 1873 the following record of cases observed by me. The subjects, save one, were inmates of the City Hospital at the time of the introduction of the first case in the person of Dixon, and were confined to the house by the blockade established immediately after his death. A detail of cases which are so clearly traceable to the origin of the infection will present the type of the disease as manifested in Mobile. I have a further object also in view, and that is to add my testimony to the valuable observations made by Dr. J. C. Faget of New Orleans as to the relations between the temperature and the pulse-beat in yellow fever.

I am disposed to conclude, from my notes, that the pulse, more than the temperature, observes a fixed order of movement. This is generally a movement of recession from the beginning. Dr. Faget called attention to this fact in 1859, and has repeated it recently with the support of five hundred cases observed in Guiana and New Orleans. It is, however, in comparing the markings of the thermometer simultaneously with the count of the pulse that we are struck with the fact, not noted in other diseases, that during an ascending temperature we have a descending pulse. This relation presenting itself at the outset of the fever, furnishes a most valuable means of diagnosis.

The first case to be mentioned is that of Dixon himself, the *fons et origo* of the epidemic. He came into the hospital on the third day of the fever, with a sodden, drunken expression of countenance, hot and pungent skin, great precordial tenderness, urine scant and albuminous, pulse 90, temperature 107° Fah. Shortly after he was put to bed he ejected from his stomach a basin full of viscid fluid, which soon deposited a coffee ground sediment. The prognosis was necessarily bad. He was put upon stimulants and beef-essence. The following morning the temperature was 104°, the pulse 60, black vomit

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having been copiously ejected during the night. Evening: temperature still receding, and pulse becoming quicker. During the following night the patient became delirious, and died next morning.

It may be noted here that black vomit occurred when the temperature was probably at the highest, namely, 107° Fah., a degree to which this fever seldom attains, and that at the climax of the fever the pulse numbered only 90, and was bubbly to the feel. Surely the heart fails, either from the depressing influence of the intense heat, or from the more probable cause, a fatty degeneration of its substance established by the septic poison itself.

William Smith, a young German, convalescing from a malarial attack, sickened of the fever on the 17th of September, five days after the death of Dixon, and died on the 20th. His case presented the usual characteristics, the temperature not attaining so high a grade, but exhibiting the same relations with the pulse as were observed in the former case. This patient had no communication with Dixon, was not even in the large ward into which he was first brought.

Sister Xavier was taken on the 23d, and died on the 27th of September. She was not under my charge, and her case was not reported as yellow fever; but I think there can be no doubt as to its true nature, and I mention it here.

The following cases are reported more circumstantially, as the observations were made beginning with the first manifestations of the malady:

Thomas Nugent, a young, plethoric Irishman, was attacked on the 25th of September. First observation at nine o'clock, A. M. Pulse 120, temperature 103, tongue furred, bowels confined, urine copious and free from albumin, patient restless, face flushed, eyes injected and watery, head-ache and back-ache. Evening: pulse 110, temperature 104, bilious vomiting between visits, and continuing. 20th—morning: pulse 100, temperature 104, tongue red, countenance calm, head-ache and back-ache ceased, no albumin in urine. Evening: pulse 100, temperature 104°50′, skin perspiring, some nausea, bow-

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els moved. 27th—morning: pulse 100, temperature 102, tongue red, urine albuminous, skin moist, nausea, patient calm. Evening: pulse 100, temperature 103, tongue furred and red at edges, conjunctiva and skin yellow, precordial tenderness, white vomit. 28th—morning: pulse 97, temperature 102, urine albuminous, precordial tenderness, nausea, skin and eyes more deeply tinged. Evening: pulse 97, temperature 103, restless, white vomit with specks. 29th—morning: pulse 90, temperature 101, patient calm, great nausea and precordial tenderness, black vomit. Evening: pulse 90, temperature not noted, suppression of urine, black vomit, hæmorrhage from nose and bowels. Died at 8 o'clock P. M.

This patient could not be induced to think he was sick, and persisted in getting out of bed and sticking his fingers down his throat to induce vomiting. The treatment consisted in a calomel purge, followed by quinine in large doses for the first twenty-four hours, then in smaller quantities for the next twenty-four hours, after which stimulants and beef tea.

The next patient was Louisa, a hospital nurse, who was taken with the fever on the 29th of September. First observation made at 2 o'clock P. M. Pulse 110, temperature 104, skin moist, bilious vomiting, delirious. Evening: pulse 90, temperature 102, delirious, bowels moved. 30th—morning: pulse 90, temperature 100, delirious, precordial tenderness. Evening: pulse 84, temperature 100, semi-conscious. 31st—morning: pulse 84, temperature 99, semi-conscious, stomach tender. Evening: pulse 84, temperature 99, mind clear, much prostrated with tenderness of stomach and burning heat within. October 1st—morning: pulse 64, temperature 99, rested during night, stomach tender. From this time on she continued to improve and made a good recovery, but was subject for some time to indigestion when imprudent as to diet.

The sensation of burning of the stomach was a marked symptom, throughout, manifesting itself in her delirium by her clamors for ice. Ten grains of calomel in the beginning of the attack, ice to allay the burning thirst, and applied to the head to calm the excited brain, and chloral in full doses to

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procure sleep, constituted the treatment during the period of excitement. This was followed, as the fever receded by stimulants and food.

Sister Mathilde was taken with chill on the 4th of October. First observation, evening: pulse 112, temperature 104, eyes and face injected, great pain in head and back. 5th—morning: pulse 88, temperature 102, less pain but oppression at the pit of the stomach with some nausea. Evening: pulse 94, temperature 103, oppression referred to head, less at stomach. 6th—morning: pulse 100, temperature 101. Evening: pulse 107, temperature 98, skin yellowish, eructations with precordial fullness. 7th—pulse 100, temperature 98, feels comfortable, stomach quiet. 8th—morning: pulse 86, temperature 96, urine albuminous, tongue dry, stomach quiet. 9th—morning: pulse 96, temperature 99, tongue moist, bilious stools. 10th—morning: pulse 100, temperature 99, skin dry, tongue dry, urine free with trace of albumin. 11th—morning: pulse 90, temperature 101, tongue moist, urine free. From this on she gradually improved, and made a good recovery. The treatment consisted of purgation first, followed by quinine for the first twenty-four hours; then chlorine, nux vomica, phosphate of lime, stimulants and food, according to indications as they arose.

Sister Margaret was taken on Thursday, October the 16th. First observation at 2 o'clock P. M.: pulse 120, temperature 101, pain in head and back, eyes and face not injected. Evening: pulse 140, temperature 97, much nervous agitation. 7th—morning: pulse 112, temperature 101, feeling better, bowels moved, no pain. Evening: pulse 114, temperature 103, pain in head, eyes heavy with dull expression. 18th—morning; pulse 110, temperature 102, urine free, no albumin, general hyperæsthesia, no tenderness on pressure over the stomach. Evening: pulse 84, temperature 102, stomach tender and weak, with general feeling of prostration. 19th—morning: pulse 75, temperature 100, trace of albumin in urine, feels calm, no nausea. 20th—urine albuminous, skin yellow, vomited "beeswings" during the night. 21st—urine

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partially suppressed and heavy with albumin, relishes champagne. 22d—feels better, pulse stronger, expression of countenance better, stomach intact. No further special observations were made. Albumin disappeared from the urine entirely on the second day of convalescence. She made a good recovery. This rapid restoration of the function of the kidneys was noticed in the majority of the cases that recovered. The treatment of the last case was very similar to the one preceding it.

Mrs. Nicholson was attacked on Thursday, the 16th of October. First observation on the 17th—morning: pulse 120, temperature 103, great pain in head and back, no vomiting or sick stomach, skin sweating and flushed. Evening—pulse 116, temperature 104, less pain in the head, restless and sleepless, no thirst, no tenderness over the stomach. 18th—morning: pulse 116, temperature 105, slept well, bowels and kidneys acting, skin dryish, no thirst. Evening: pulse 120, temperature 104, headache, vomiting bile, restless. 19th—pulse 108, temperature 102, stomach quiet, general soreness, great prostration, capillary circulation sluggish, yellowish tinge of skin. 20th—morning: pulse 100, temperature 100, urine albuminous, stomach tender, with nausea and white vomit, restless and sleepless during the night, now more quiet, no relish for stimulants or food, bowels and kidneys acting. Evening: pulse 100, temperature not taken, feels prostrated. 21st—morning: restless and weak, no relish for food. Convalescence was slow. The treatment in this case consisted of gentle laxatives, mild diuretics, phosphate of lime, brandy and beef tea.

I should mention that before the last two patients were taken, the Board of Health finding that their efforts to confine the disease to the hospital had failed of their purpose, had removed the embargo, and patients suffering from dengue, which was prevailing at the time, had been admitted. I am confident that this disease imposed some of its expressions upon the former, and altered the general course of the fever in these two cases. Witness the very quick pulse, and the

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subsidence of the temperature during the first twelve hours, to be re-established in one of the cases on the second day. Witness also the general soreness of the muscles on pressure at a later period. In the other case there was no complaint referable to the stomach, no thirst, and no tenderness until the third day, while there was general muscular soreness in the later period of the attack, with a decided scarlatinous eruption.

The following case was attended outside of the hospital, but within the infected district. Mr. Richardson was taken with a chill during the night of the 17th of October. Was seen first at 11 o'clock A. M. on the 18th: pulse 116, temperature 102, severe pain in head, back and abdomen, skin sweating, no thirst. Gave three compound cathartic pills, and nitrate of potash. Evening: pulse 108, temperature 104, pain in back, bowels moved. Ordered one drachm of chloral in two doses; continued potash. 19th—morning: feels better, slept some, bowels moved freely, no abdominal tenderness, pulse 88, temperature 102. Evening: pulse not noted, temperature 103, bowels checked. Continue potash and chloral, if necessary. 20th—morning: pulse 106, temperature 102, tongue red, feels weak and restless, slept some, intellect wandering, nausea but no pain on pressure over the stomach, kidneys acting, urine albuminous. Ordered phosphate of lime and aromatic spirits of ammonia, blister to epigastrium, and beef tea. Evening: pulse 100, temperature 102, urine free. Continued the same treatment, and directed brandy if the fever should subside. 21st—morning: pulse 88, temperature 100, prostrated, restless, thirst, hiccough, some nausea but no vomiting, tongue red. 22d—rested well during the night, feels better, tongue red, urine free. Continue stimulants in form of milk punch. 23d—still improving, relishes the milk punch and feels hungry. The convalescence was rapid. This individual was a subject of chronic dispepsia, and hence had a feeble constitution. He, however, passed through a very well marked attack of the fever, manifesting all of its phenomena short of black vomit, and recovered

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without the natural course of the disease having been altered by the medication employed. This was purposely simple. As we do not usually leave nature to her own methods of curing disease, but endeavor to direct events, we are apt to overlook the alterations, good or bad, affected by remedial agents. The tracing of the natural history of any disease without taking into account such deviations must necessarily be defective. To remedy this a large number of cases subjected to varied treatment, or to no treatment at all, should be observed. We shall thus learn nature's laws and appreciate the importance of not contravening them. By an accumulation of such facts, showing forth at the same time the true, instead of the presumed, value of remedial agents, our therapeutics will become more efficient for good. I am aware that the detail I have made presents this very difficulty to which I have alluded, but the facts recorded, will, with those adduced by others, assist in establishing upon a basis of certainty the views expressed by Dr. Faget."

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REPORT OF DEATHS

Occurring from Yellow Fever, in the City of Mobile, for the year 1873.

August	26.	Owen McKenna, 117 S. Hamilton st.; age, 28 years.
Sept'r	13.	Edward Dickson, City Hospital; 30 years.
"	17.	Sister Mary Regina Smith, Providence Infirmary; 28 years.
"	18.	John Young, Hospital st.; 35 years.
"	19.	William Smith, City Hospital; 21 years.
"	28.	Elizabeth Ann Merritt, Shell road, W. Broad st.; 61 years.
"	29.	Thomas Nugent, City Hospital; 25 years.
October	2.	Ellwood McCann, Palmetto, bet. Marine and Charles; 14 years.
"	2.	Ann Scully, cor. Wilkinson and Adams; 46 years.
"	5.	A. D. Cientat, Spring Hill road, in Pine; 6 years.
"	7.	Dave York, Palmetto, bet. Marine and Charles; 35 years.
"	7.	Dr. Frank M. Stone, cor. Franklin and Charleston; 36 years.
"	9.	John D. Lanwek, Jr., Spring Hill road, in Wilkinson st.; 4 years.
"	11.	George Smith, City Hospital; 40 years.
"	14.	David Turner, Shell road and Broad st.; 24 years.
"	21.	C. C. Coulton, Marine Hospital; 35 years.
"	21.	Caroline McCann, Palmetto, bet. Marine and Charles; 33 years.
"	25.	Ben Lane McCann, Palmetto, bet. Marine and Charles; 3 years.
"	24.	Caroline Buttel, cor. Scott and St. Anthony; 55 years.
"	28.	Nellie Smith, Marine, bet. Augusta and Charleston; 2 years.
"	31.	Harmon Earle, cor. Canal and Jefferson; 50 years.
Nov'r	8.	K. M. Cambell, Providence Infirmary; 32 years.
"	10.	Joseph Smith, Marine, bet. Augusta and Charleston; 12 years.
"	17.	Maria Wheeler (colored), Spring Hill road; 17 years.
"	21.	Joshua J. Bethea, cor. Broad and Congress; 26 years.
"	22.	Richard F. Knott, S. side St. Francis; 58 years.
Dec'r	1.	Jacob Groeschner, cor. Warren and Church; 13 years.

THOMAS L. GELZER, M. D.,
Reg. Vital Statistics.

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METEOROLOGICAL TABLE.

DATE.	BAROMETER							THERMOMETER							WIND.							Am't rain & melted snow	
		Mean of			Range.				Mean of			Range.				Number of miles.							
	Mean.	A. M observation.	P. M observation.	Night observation.	Highest.	Lowest.	Difference.	Mean.	A. M. observation.	P. M. observation.	Night observation.	Maximum.	Minimum.	Difference.	Prevailing Direction.	Noon to 6 P. M.	6 P. M. to midnight.	Midnight to 6 A. M.	6 A. M. to noon.	Maximum velocity during month per hour.	Total	Amount in inches.	Number of days on which rain or snow fell.
1873.																							
January	30.160	30 176	30.131	30.143	30.608	29.800	.808	46 33	41.12	52.61	45.25	69	18	51	N	.....	.....	.....	.....	28	4016	4 16	5
February	30 138	30.167	30.107	30 138	30.456	29·659	.761	56.12	50.25	62.46	55.67	75	35	40	S	.....	.....	.....	.....	32	3599	3.15	8
March	30.199	30.235	30.162	30 205	30.708	29.730	.969	57.04	51.06	63.87	56.19	77	34	43	S	1598	926	663	997	22	4184	3.86	11
April	30.063	30,099	30 030	30.061	30.333	29.858	.495	65.67	59.83	73.46	63.73	85	44	41	S	1508	656	623	1118	36	3905	0.88	8
May	29.981	29 994	29.951	29,985	30.168	29.666	.502	73.94	70.74	80.35	71.83	92	55	37	S	1380	696	541	857	24	3474	11.47	14
June	30.041	30 066	30 011	30 046	30.208	29.741	.467	79 33	76.90	83.83	77.26	95	68	27	S W	991	417	289	632	25	2329	9.87	15
July	30.106	30.129	30.067	30.107	30.312	26.927	.385	82.15	77.90	88.54	79.80	98	69	29	S	1413	611	377	879	32	3280	8.75	10
August	30 044	30 070	30 008	30 043	30.234	29.854	.380	80.26	75 96	84.67	78.06	94	70	24	S	1276	643	457	753	36	3129	10.35	16
September	30.037	30 055	30.001	30 044	30.170	29.792	.378	76.16	72.20	81.76	74.46	91	61	30	N E	1276	835	853	1032	16	3996	8.07	12
October	30.121	30 141	30 077	30 126	30.485	29.800	.685	65.22	58.16	72.96	6.309	87	34	53	N	1330	741	670	1053	26	3795	1.85	5
November	30. 124	50. 146	30 085	30 130	30.444	29.521	.923	57.71	52.43	63.73	54.70	74	30	44	N	1087	680	608	739	28	3114	3.23	6
December	30 226	30 239	30 187	30 226	30.503	29.792	.811	54.11	48.90	58 54	53 45	74	28	46	N	1102	755	898	1046	20	3801	2.97	8
Annual means	30.102	30 126	30.068	30.104	30.385	29.761	.630	66.17	61 29	72.23	64.45	84 25	54.50	38.75	S						3551	5.71	9.83

GENERAL REMARKS.

January.....Changeable weather and heavy rains.
February.....Variable temperature, high winds and changeable weather.
March.....Variable temperature, variable barometer; rain-fall small for season as compared with corresponding months.
April .....Steady barometer, variable temperature for the season; rain-fall very light.
May....Heavy rains, accompanied by severe thunder and lightning; rain-fall larger than corresponding months of past years.
June.....Heavy rains, changeable weather and severe thunder and lightning.
July.....Heavy rains, changeable; numerous local storms.
August.....Heavy rains; local thunder storms generally every day.
September.....Local thunder storms, steady barometer generally.
October.....Variable temperature; first frost noticeable on 26th.
November.....Changeable weather, variable barometer.
December.....Light rains, mild temperature and variable barometer.

Station—MOBILE, ALA.

D. O'DONOGHUE, Observer.

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PART SECOND.

THE LESSONS OF THE EPIDEMIC.

Having thus given a general history of the Epidemic in several of the cities and towns, which it has visited during the year, we proceed now to the discussion of such special questions connected with the general theory of yellow fever as we are able to illustrate by the facts which we have collected.

In regard to the general management and medical treatment of the malady, no progress of any sort has been made, and we are still under the necessity of using the same empirical and expectant modes of medication as heretofore.

But without further preface, there are three special questions to which I shall invite attention, namely:

The propagation of yellow fever.

The prevention of yellow fever.

The relations of yellow fever and dengue.

Upon all of which questions it is perhaps possible to say something new.

THE PROAGAPTION OF YELLOW FEVER.

Of all the problems connected with the study of the natural history of yellow fever, as it presents itself in the Gulf States, none is of greater practical importance than this: Whether this fever is ever indigenous amongst us; or whether it is always of exotic origin, and finds its way to our shores only through the agency of direct importation?

That as a matter of possibility it can be transported from place to place; that as a matter of fact it has been transported across wide spaces, both of land and of water; that it has indeed been very frequently brought from foreign countries into

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our own seaports, and from these disseminated to many of our interior towns and cities; are propositions as well established as any others in the whole range of medical knowledge. But whether it also sometimes originates on our own soil, is a matter about which there is much difference of opinion.

Only a few years ago, and very specially during the decade that followed the publication of the very voluminous and very erudite, but in my judgment not very able work of LaRoche, I think it is safe to say that the decided preponderance of opinion amongst the physicians of New Orleans and Mobile was in favor of the doctrine, that in these cities it was always indigenous; that it was never imported; that, in a word, it was the legitimate offspring of telluric and climatic conditions, and not susceptible of transportation at all.

There were some influential physicians who were the advocates of an other doctrine, namely: That while it was not of indigenous production, not the offspring of local conditions, that still it was not susceptible of transportation through the agencies of human travel and commercial intercourse, but was mysteriously disseminated over certain zones by atmospheric or telluric waves of some unexplained character.

There existed also a general disposition to identify yellow fever, as to its etiology and its essential nature, with our familiar paludal endemic, and to regard it as only a more malignant variety of malarial fever.

But within the last twenty years, and very noticeably within the last ten years, the tendency of opinion on all these points has undergone considerable change. The doctrine of the affiliation between malarial fever and yellow fever has been completely overthrown, never any more to be revived. The doctrine of the transmission of yellow fever, from continent to continent, and from city to city, by telluric or atmospheric waves, has been pushed into the background of speculation. And the doctrine of direct importation has been so thoroughly established by the concurrence of multitudes of facts as to admit no longer of controversy.

But while it is now generally conceded that this pestilential

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fever may be imported from abroad, and that it may be propagated along the lines of commercial intercourse, it is still contended by some that it also sometimes arises amongst us independently of foreign sources of infection. And there are two hypotheses as to how these domestic epidemics are to be accounted for. The first is, that they are strictly autocthonous—the malignant but legitimate offspring of local endemic conditions. The second is, that they are derived from the germs that have remained over from some previous epidemic —germs that have been able to maintain their vitality from one season to another, because of mild winters and other circumstances favorable to their preservation and development.

In the present state of our knowledge we are not able to say with certainty, whether either or both of these hypotheses may be either true or false. We are able to say, however, that the presumptions of contemporary writers are entirely opposed to the first; and if the second is true at all, it is true only of one or two of our Gulf cities, and only occasionally even of them.

The problem of the propagation of yellow fever is closely associated with another problem, namely: the problem of the specific nature of the yellow fever poison. I call this poison specific, because it always produces yellow fever and never any other disease; and I call yellow fever a specific disease, because it is always produced by the yellow fever poison and never results from any other cause.

The doctrine of morbid poisons has undergone great development during the last ten years. In 1864 Dr. Beale announced the microscopic demonstration in vaccine lymph of minute glistening soft-solid albuminous particles, which he assumed to be the true contagion of vaccinnia. In 1866 he found similar microscopic particles in the infectious fluids of the cattle plague, and made the assertion that it was through their agency that this bovine pestilence was disseminated. About the same time Dr. Burden-Saunderson proved experimentally that the infectious principle of the poison fluids of the cattle plague is not dialyzable; and it follows from this

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that it must be composed of colloidal matter. He did not determine whether the infectious colloid was particulate or not, but his experiments, as far as they go, are confirmatory of Beale's hypotheses. A little later Dr. Chauveau, of Lyons, conducted a very elaborate series of experiments, which are considered as having definitely established the particulate character of the contagia of small-pox, sheep-pox, cow-pox, and farcy. Subsequently Coze and Feltz, of Strasburg, made the announcement that they had been able to demonstrate also, the particulate nature of the several contagia of measles, scarlet fever, typhoid fever, and septicæmia. And later still Klebs, in a remarkable account of some observations made by him in the military hospitals at Carlesrue in 1870–71, ascribes pyæmia and septicæmia to the presence of small glistening particles of solid matter. Similar conclusions have been reached by various other observers, so that there is now a very general agreement amongst medical authorities, that the morbid poisons of the zymotic family of diseases, are albuminous, colloidal, solid and particulate.

But with reference to the specific nature of these infectious particles there is some difference of opinion.

Klebs believes that in pyæmia they are the spores of a special fungus which he names *microsporon septicum*. Coze and Feltz, and Ferdinand Cohn, and many others, teach that in all these diseases the poisonous particles are *bacteroid*; and they even distinguish specific forms among them, as *bacterium sphero*, and *bacterium catenula*.

Beale, on the contrary, holds that they are particles of the living protoplasm of the diseased organisms—particles which have undergone organic degredation and functional perversion, according to the character of the pathological movement, which serves to invest them with specific poisonous properties.

To sum up this part of the argument, without going into any detailed discussion of the intimate pathology of contagion, we may accept, as sustained by a reasonable amount of proof, the general doctrine, that the specific poisons of the zymotic

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diseases exist as a rule in the shape of solid colloidal particles of extremely small size, say less than the twenty thousandth of an inch in diameter; solid, and therefore ponderable; colloidal, and therefore presumably organic.

While in many directions our knowledge of these infectious particles or disease germs is exceedingly imperfect, it is well established that they increase very rapidly in numbers; sometimes certainly within the diseased organism; sometimes, also perhaps, outside of the diseased organism. This multiplication must be accomplished in one of two ways. Either the disease germs themselves must pass through the various vital stages of growth, development, and reproduction, and so multiply their pestiferous generations under the sun after the ordinary fashion of living creatures; or else they must through some mysterious catalytic influence transform the normal protoplasm of the organisms which they invade into germs abnormal and malignant like themselves.

The first hypothesis is the simplest, the easiest of apprehension, and was the first to present itself in the history of pathological speculation. It may turn out, however, that the second hypothesis makes the nearest approach to the truth. Of one thing, in the meantime there can be no doubt, and that is the rapid and abundant multiplication of the disease germs.

While there is good reason to believe that the infectious germs of small-pox, cow-pox, and several other eruptive diseases have been actually demonstrated under the microscope, it can not be claimed with any confidence that anybody has ever really seen the germs of yellow fever. Nevertheless we do not hesitate upon analogical grounds to affirm that such germs do exist. There is no other theory capable of explaining the phenomena of the disease.

It being admitted that the yellow fever poison is a particulate, ponderable, material thing, endowed with a certain tenacity of life, and an indefinite faculty of reproduction, it is easy enough to understand its transportation from place to place—how it can be wafted for short distances by the wind,

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and how it can be carried for long distances in ships, and steamboats, and railroad cars, along with dry goods, and groceries, and in the persons or the clothing of men and women.

That the pestilence in its migrations follows the usual routes of commerce and travel is certainly true. That it has never been known to make its way over any other routes than those which have been opened by human enterprise I think is also certain. In our recent epidemic, the agents by whom the infection was introduced have been definitely determined in almost every locality which was visited by the disease. There has been some question as to its origin in New Orleans; but it is at least a significant fact that the first case should occur on a vessel from Havana where the fever was epidemic at the time of her departure. It was brought to Memphis by the steamboat Bee, no matter whether the agent of infection was the boat itself, or the poor anonymous wretch who died in Riley's shanty. It was brought to Pensacola from Havana by the Golden Dream. It was brought to Mobile by Edward Dixon. It was brought to Montgomery by Mollie Jackson and Mr. Cram. It was brought to Calvert by Mr. Hughes. It was brought into the neighborhood of Greenwood by Harris F. and his brother Voss. Who can doubt that human agency is equally responsible for its introduction into those other cities where its mode of entrance has not been so clearly traced?

These facts are of very grave importance. They show beyond all peradventure of doubt that yellow fever is a transportable malady. But they show much more than this. They show that yellow fever is to be no longer confined to the seaboard, but that along all our routes of river and railroad travel every city and almost every village is annually in danger of invasion. And the more populous our country becomes and the more our facilities of rapid intercommunication are multiplied, the greater becomes the danger of pestilential visitations, and the more dreadful the consequences that follow in their train.

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THE PREVENTION OF YELLOW FEVER.

In view of this state of things it becomes a question of very great importance, whether there is any way by which our people can protect themselves against these dreadful epidemics? Or whether, in spite of all our science, against the pestilence which walketh in the darkness and which wasteth at noonday, beneficient Providence has left us absolutely without defence? There are two measures of public prophylaxis which have recently attracted much attention, namely, Quarantine and Disinfection. Let us briefly consider these.

QUARANTINE.

If yellow fever is really an exotic it is then certain that absolute quarantine will guarantee absolute protection. But in this age of steamships and railroads and feverish commercial activity, and with such a spirit of reckless enterprise and adventure to deal with as is now abroad in all civilized countries, an absolute quarantine may be regarded as practically impossible. Must we, therefore, because quarantines are necessarily imperfect abandon them altogether? I think not. I think that quarantines may be so conducted that, while they would not be absolutely prohibitory of commerce and travel, they would still afford an amount of protection which would be of very great value. Such quarantines might sometimes keep the fever away altogether. Upon other occasions they might simply delay its advent for a longer or a shorter time. It might be said on these occasions that the quarantine had failed to be of any use. But it is a familiar maxim, that half a loaf is better than no bread at all; and I do not hesitate to say that if the quarantine delayed the entrance of the pestilence into any city for only a single week it would be worth many times over the amount of money it would cost to maintain it.

The difficulties that stand in the way of efficient quarantine are many and great. There are difficulties of local administration; and there are other difficulties growing out of the

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imperfections of our scientific knowledge. Some of these difficulties find illustration in the history of the recent epidemic. There was quarantine at New Orleans. The Valparaiso was detained at the quarantine and was disinfected. There was no fever on board and had been none. She anchored at the wharves of the city, and in a few days her mate sickened and died. There was quarantine at Pensacola. Nevertheless, the pestilence broke through and devastated the city. But the Golden Dream was detained at quarantine nearly a month. Who shall say how much worse the epidemic might have been if she had been allowed to approach the city immediately upon her arrival?

Many difficulties of local administration might be considerably diminished by the concurrent action of all the Gulf States and the establishment of an unbroken line of quarantine stations along the entire Gulf coast. But for many reasons it would be better if quarantine against foreign countries were under the control of the general government. It is through the various channels of commercial intercourse that foreign epidemics are brought to our ports; and it would seem to be evidently expedient that the power which regulates commerce should also have the regulation of quarantine.

Something in this direction has been done already. In June, 1872, under a joint resolution of Congress, Assistant Surgeon Harvey E. Brown, of the United States army, was detailed by the Secretary of War to make investigations with a view to "providing for a more efficient system of quarantine on the Southern and Gulf coasts." He made his report, consisting of 117 printed pages, and containing a great deal of important information, on the 2d of December. In furtherance of the same movement, a bill "to prevent the introduction of infectious and contagious diseases into the United States," has been presented to Congress during its present session, by Mr. Bromberg, of Mobile. It is well adapted to secure the end in view, and it is to be hoped that it will be passed into a law.

As to domestic quarantine, that is to say, quaratine estab-

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lished by one of our own communities against another, although it is of much intrinsic interest, I must omit the discussion of it from this essay.

DISINFECTION.

If I were writing a general treatise on the theory and practice of disinfection, I should have much to say that is more or less new, and I think important. But inasmuch as the prophylactic power of carbolic acid has been very emphatically asserted by the Boards of Health of New Orleans and Mobile, my account of the epidemic would not be complete without some examination of the question of disinfection in so far as the use of this particular agent is concerned.

I cannot discuss here with any fullness of detail the various theories of infection and disinfection, which have received the support of scientific writers; but it is necessary to call attention to a few preliminary principles such as these that follow:

That all infectious maladies are grouped together in a common class under the name of zymotic diseases, and that this class includes both yellow fever and dengue.

That these zymotic diseases are supposed to be connected in some way with an obscure pathological process, which is analogous to the ordinary processes of fermentation and putrefaction.

That low forms of living creatures are always associated with fermentative and putrefactive processes; it being impossible, however, in the present state of our knowledge, to say whether these creatures are the factors or the products of the processes in question. Take as examples here, the association of *Torula cerevisia* with the vinous fermentation, and of *Micoderma aceti* with the acetic fermentation.

That in much the same way as that which is found to obtain in these familiar cases of fermentation, living organic germs are also associated with the analogous pathological process of zymosis, the specific character of the germs differing with the specific character of the disease in connection with which it occurs.

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That these organic germs, specific and malignant, miscroscopic and inscrutable, are the active agents engaged in the propagation of epidemic pestilences. They first establish themselves in colonies of inconceivable numbers in the impalpable kingdoms of the air, whence, through the mediation of the great physiological function of respiration, they invade the living bodies of men and women, in which, when the vital powers are not sufficiently strong to resist the invasion, they set up the same sort of diseased action as that with which they were originally associated, and so establish epidemics.

That inasmuch as carbolic acid and several other chemical agents, which together may be conveniently designated as antiseptics or disinfectants, are known to have the property of holding in check the ordinary processes of putrefaction and fermentation, it is reasonable to presume that they are also competent to hold in check the allied process of zymosis, and thus to prevent the multiplication of infectious organic disease germs.

That further, inasmuch as these antiseptics and disinfectants are known to have the property of destroying the vitality of many animal and vegetal organisms, it is reasonable to presume that they are also competent to destroy the organic germs which propagate epidemic diseases.

That in order to accomplish this destruction of disease germs, it is necessary that the germs in question should be brought into actual contact with the disinfecting agent, so that when the epidemic poison is disseminated through the air it is necessary in like manner to disseminate the antiseptic antidote. The principal agents employed for atmospheric disinfection are carbolic acid, chlorine and sulphur.

Such is a brief statement of the doctrines upon which the practice of disinfection is based. It cannot fail to be a matter of surprise to all thoughtful persons that these doctrines include so much that is merely probable and presumptive, and so little of positive knowledge; and it is hardly necessary for me to insist that inductions derived from such uncertain data must be received with a great deal of caution; nay, more,

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that they must be regarded as of very questionable validity until they have been verified by the test of experience.

Let us see, then, precisely what has been done in the way of disinfection as a prophylactic against yellow fever, and with what results. The example of New Orleans is that which is principally relied upon. It was first employed there on a large scale in 1870, when there occurred five hundred and eighty-seven yellow fever deaths. How many there might have been without the carbolic acid, it is of course impossible to say.

Yellow fever again visited New Orleans in 1871,—a memorable year in the history of disinfection. It was in this epidemic that Dr. Albers, the champion disinfectionist, put forth all his energy and exhausted all the resources of disinfection and fumigation in his contest with the fever in the Fourth District. There were one hundred and fourteen cases, and fifty-four deaths. Sixty-six cases occurred within a circular area of about fourteen hundred feet in diameter, in the center of which stood the house of Mr. Rawlings, a member of the Board of Health, and of these sixty-six cases, forty-five died. This region of infection Dr. Albers had under his own special charge. It seems to me that the result could hardly have been worse.

In 1872, in New Orleans, disinfection was again resorted to. There occurred eighty-three cases of yellow fever, and thirty-nine deaths. Of these cases sixty-one originated in the Fourth District, where carbolic acid was used with a thoroughness and pertinacity that deserved the reward of better success.

Still again, in 1873, and on a still larger scale, the aid of carbolic acid was invoked to oppose the progress of yellow fever in New Orleans. We have seen how signally it failed at every point of the line along which the conflict was waged,—how it failed in the case of the Valparaiso, in the case of the infected vessels at the wharves in the Third District, and in the case of the infected region between Chippewa street and the river in the Fourth District,—and how, in spite of sixteen

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thousand dollars' worth of carbolic acid, the epidemic pursued the even tenor of its way until it was met and conquered by the invincible armies of the Frost.

In Memphis, the failure of disinfection by lime, and street gas, and carbolic acid was so complete, that no attempt has been made to claim for them that in that epidemic they were of any advantage at all.

In Mobile, the account which I have given shows clearly that all the claims which have been advanced in favor of the beneficent influence of carbolic acid during our recent epidemic, are preposterous and absurd. It failed at the City Hospital. It failed on the Spring Hill Road. It failed on the Shell Road. It failed in the McCann neighborhood. It failed everywhere, and it failed completely.

In not one single instance, then—and I make the declaration with the utmost deliberation and emphasis—in not one single instance in which carbolic acid disinfection has been opposed to the progress of yellow fever, do the plain unvarnished facts furnish any solid foundation for the presumption that its influence has been prophylactic, or in any other way of an advantageous character. Very certain it is, that it has never driven away the fever from any region in which it has once obtained a footing. In New Orleans, in Memphis, and in Mobile, in spite of all the puny chemical weapons of our Boards of Health, the pestilence has successfully maintained the conflict, and continued to claim its daily tribute of human lives until deliverance has been vouchsafed to the stricken people along with the frosts of November.

But perhaps it has at least robbed the pestilence of some part of its malignant energy? Or diminished the number of cases? I think not so; and the facts which have been detailed furnish but scant reason for any such flattering conclusion. Or shall we say, that if the disinfection failed to check the progress of the fever, or to modify its type in the infected districts, that peradventure it may have restricted the limits of the infection and protected adjacent neighborhoods from invasion? This is what has been specially claimed for it both

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in New Orleans and in Mobile. But this claim also is utterly untenable. The argument in support of it is this: That in Mobile this last year, and in New Orleans for three successive seasons the disease was confined to certain localities, and did not on any one of these occasions extend its ravages over the whole population of either one of these cities.

But we may admit the fact, and still it does not follow that the localization and limitation was the result of the disinfection. The history of yellow fever shows that its restriction within narrow limits and quite definite boundaries, is not at all an uncommon occurrence, even when the aid of disinfection has not been invoked to account for it. In Mobile in 1843, the epidemic confined its ravages to that section of the city south of Dauphin street; while in 1844, as if to vindicate its impartial malice, it reaped its harvest of death from the northern section of the city, the portion that had suffered the year before remaining exempt. In Memphis, in 1855, the disease was epidemic south of Union street, only a few cases occurring in the far more populous portion of the city north of Union street. In New Orleans, in 1868, the fever made its appearance in a few cases with only three deaths; and again in 1869, there were also a few cases with three deaths. In Mobile, in 1873, as we have seen, the fever invaded forty-one different house in which no disinfection was used, to the extent of only one case in each house, no subsequent cases occurring in any of them. Illustrations of this sort might be indefinitely multiplied. I have taken only a few of those which were nearest at hand. It is manifest, therefore, that we are not warranted in estimating at any very high rate the protective virtues of carbolic acid disinfection until we have better evidence in its favor than any that has yet been adduced.

This is a question on which it is very desirable that correct and definite views should be speedily reached. For carbolic acid disinfection is certainly costly; is certainly also exceedingly disagreeable; and in view of the appalling mortality which has on several occasions occurred in connection with it, there is room for the suspicion that some part of the mor-

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tality may be due to the carbolic acid itself. It will be well for us, at any rate, to pause in our indiscriminate praise and practice of disinfection until we are able to show beyond all reasonable doubt, that in endeavoring to suppress yellow fever we are not contributing something towards the suppression of the lives of our fellow-citizens.

I would not have it understood that I am making war upon sanitary disinfection, or upon carbolic acid. Far from it. But I do insist that the results of our costly experiments shall be correctly estimated, and truthfully reported, so that when we are hereafter threatened with pestilence we may know how much benefit is to be expected from it; and in view of all the facts which have been obtained up to the present time, I am obliged to add that the prospect of benefit in this direction is not very promising. There is a certain restricted use of disinfection by which we may hope to accomplish some good; but all attempts to destroy the multitudinous germs of pestilence which in epidemic seasons are scattered broadcast through the illimitable kingdoms of the air must be abandoned as altogether hopeless.

To disinfect all *out-of-doors* is a problem of more embarrassment and difficulty than seems to be generally appreciated. The immense extent expressed in any of the denominations of cubic measure, of the aerial space which it would be necessary to fill with the disinfectant in the form of vapor or of gas—this is one part of the difficulty. But this space being once filled would not remain filled. Its aerial contents, and along with them the vapors of disinfection would be swept away continually by the invisible swift winds and the tides and currents of the atmospheric ocean. This is another part of the difficulty. The vast amount, in pounds avoirdupois, or in gallons of wine measure, of the disinfecting material which would be necessary to supply this immense and continuous demand, day after day and week after week; and the large expense of it in dollars and cents of federal currency—this is another part of the difficulty. But suppose all these obstacles to be overcome; and that the air should

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be kept sufficiently saturated with the disinfectant to assure the destruction of the disease germs. It then remains to be considered whether air so laden with destructive chemical vapors would still be competent to serve the purposes of respiration—whether the same poison which proves fatal to the disease germs would not also prove fatal to human beings and domestic animals. This is another part of the difficulty,—a consideration too which is at once seen to be of cardinal importance. I venture to hope that these brief suggestions will serve to indicate the real nature of the problem of atmospheric disinfection, and what sort of an enterprise it is that we have upon our hands when we undertake the purification of the great atmospheric ocean.

As I have intimated there are some more restricted applications of the practice of disinfection from which we may still hope to derive some hygienic advantage. The disinfection of all solid articles and textile fabrics—of floors, and walls, and furniture and bedding, and all sorts of clothing, and the excretions of the sick, can certainly be effectually accomplished. This may be done by heating such things to two hundred, or to two hundred and fifty degrees Fahrenheit. Or else by the direct application of some chemical disinfectant in a solution of adequate strength. Of these chemical agents there may be mentioned the bichromate of potash, the sulphate of copper, and the chlorides of zinc and iron. Among these also there can be no question of the power of carbolic acid. In the suburbs of Mobile it killed the grass on the sidewalks and the frogs in the gutters.

The disinfection of such small portions of air as can be confined in the rooms of houses, or in the hulls of ships, would also seem to be entirely practicable. We have only to fill the designated space with the fumes of burning sulphur, or of chlorine, or of nitrous acid, or of superheated steam, and the work is done. No living creature can withstand the destructive energy of any of these agents when they are used in a sufficient degree of concentration, and with sufficient persistence.

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YELLOW FEVER AND DENGUE.

It has happened upon several occasions that epidemics of yellow fever and of dengue have prevailed together in the same city at the same time, as in Mobile and New Orleans in the year just passed. The question, whether there is some generic relationship between them, has therefore assumed a a certain amount of interest. It is a question which I cannot discuss *in extenso*. I can only give very briefly the opinions I have formed in regard to it; and I must add, in all candor, these opinions are based, so far as the nature of dengue is concerned, almost entirely on observations made in the epidemic of 1873.

I know of no other disease which has a literature in every way so perplexing and unsatisfactory as dengue. Copland has well said, that the descriptions which have been given of it are little creditable to their authors.

Dr. Faget, a most competent authority, is inclined to associate the New Orleans dengue of 1873, with paludal mucus fevers. In this, however, I must believe that he is mistaken. It is indeed a mucus fever, but not a paludal fever. Paludal fever, of whatever special type, is always endemic; is always associated with paludal localities; and is never infectious. But the dengue of 1873 presented all the characters of a true epidemic and infectious fever. As we have seen it was of very general prevalence in New Orleans. From New Orleans it spread along the coast and along the line of the railroad until it got to Mobile. Hardly a single coast village or railroad village escaped a visit from it; and in all it was epidemic. In Mobile it was more decidedly infectious than yellow fever. It did not particularly affect malarial localities, but raged most fiercely in parts of the city where malarial fever is hardly ever known to occur. Last of all it did not exhibit malarial symptoms, and was not amenable to the ordinary treatment of malarial maladies.

I do not pretend to have made any exhaustive study of this disease, but it presented certain salient points which it was

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impossible to overlook. It is infectious and epidemic to begin with. It is a mucus or catarrhal fever, in the next place. Any of the mucus membranes may be involved in the pathological aberration, but very specially those of the alimentary canal, the secretions of which are dark, acrid, depraved and abundant. I do not regard it as a true exanthem. There is commonly more or less erythema. Less frequently the eruption is herpetic. I think it is clear that the skin symptoms are of secondary consequence, are indeed neuroses reflected from the alimentary mucus membranes—such as we see for example in *herpes zoster*.

The condition of the mucus membranes which I have indicated gives rise to copious, dark, and often offensive alvine evacuations; and sometimes to the vomiting of dark-colored matters, which, although entirely distinct from the black vomit of yellow fever, might by possibility be mistaken for it.

The pains have one very marked feature, namely, diffusiveness. They are not confined to the head and the small of the back as is so much the fashion in yellow fever; but there is pain everywhere, in all the muscles, and in all the joints, and sometimes in the very bones themselves; and they are singularly persistent.

From the very beginning and through all the subsequent stages of the malady, there is a condition of extreme nervous prostration—an invincible feeling of debility and languor. I know of no other acute fever, in which, while there is so little of real danger, the apparent severity is so remarkable, and the accompanying debility so decided and so persistent. The debility indeed continues frequently for weeks, and after all the other symptoms have subsided, and makes the convalescence notably slow.

It has been said that relapses are frequent in dengue. I do not think so. I doubt, indeed, if genuine relapses ever occur in specific diseases. But however this may be, I have never seen a relapse in dengue. The type of dengue is peculiar. When fully developed it is a fever of three paroxysms. But it may be imperfectly developed, so that sometimes one, and some-

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times two of the paroxysms of the normal type, may be either absent altogether, or may be so slight and transient as to escape recognition. If the attack is very slight, only one paroxysm may attract attention; if it is moderately severe two paroxysms will be noticed; if quite severe, there will be three paroxysms of well marked character. The first paroxysm is always most intense; the last is always the mildest. I think the intervals are not perfectly regular. Between the first and second paroxysms, there is an interval of from one to two days; between the second and third paroxysms there is an interval of from two to three days.

From this sketch of the natural history of dengue, it is easy to see that it is widely different from yellow fever. How any difficulty should ever have arisen as to the diagnosis of the one from the other, is something that I cannot very well understand. It is attended with much less difficulty than the diagnosis between yellow fever and certain forms of malarial fever, about which there has heretofore been so much controversy, but which is now so definitely settled. The whole physiognomy of the two maladies is different. The patient who has yellow fever is in the grasp of a giant, and he feels it and shows it. But in dengue, while the actual suffering may be greater, as it frequently is, all organic trepidation is absent. The patient feels that he is stronger than the enemy which has fastened itself upon him. I agree entirely with Dr. Faget, when he says: "It is true, that during the first twenty-four hours there is some analogy between dengue and yellow fever, but not much; less, indeed, than there is between yellow fever at the beginning and the beginning of the initial fever of small pox." At a later period, Faget's law of the relations between the pulse and the temperature in yellow fever, becomes available as a diagnostic; and later still, albuminous urine and black vomit, when they occur, cut all the gordian knots of doubtful diagnosis, and reveal in unmistakable language the true nature of the attack. But, indeed, there is no need to wait for these later developments. From the initial chill to the last hour of convalescence, the two diseases are

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entirely distinct. It is hard to describe the features of a disease in words, just as it is hard to describe the features of a a man; but when either the fever or the man has been once seen face to face, either ought afterwards to be easy of recognition.

With reference to the effects of remedies, there are also many points of contrast between the two fevers. Of all the fevers I have ever seen, yellow fever in its initial stages is the most tolerant of large doses of quinine.

I do not stop now to discuss the question as to whether these large doses of quinine exercise a favorable influence over the subsequent progress of the disease; but rest on the simple fact of the tolerance, which cannot be gainsayed. On the other hand, I am confident that every large dose of quinine that is taken by a patient with dengue does him harm; and this at every stage of the disease. Even small doses during convalescence are of doubtful value.

In yellow fever, while it is considered to be desirable to unload the *prima via* by a brisk purgative at the beginning of an attack, I believe that it is generally agreed that continuous purgation is bad practice. But in dengue, continuous purgation is the best thing that can be done—purgation here, first, last and all the time, is the golden rule. The alimentary mucus membranes must be disgorged, and just as long as dark and offensive *dejecta* are obtained, the purgatives ought to be kept up

In yellow fever, the patient invariably and universally has a craving for cold drinks. Even ice itself seems often not to be cold enough to cool the intolerable burning. In dengue, on the contrary, there is but little thirst as a rule, and the patient is quite indifferent whether his drink is cold or warm, and not infrequently prefers to have it warm. For this observation I am indebted to Dr. F. A. Ross; my own experience has completely verified it.

From what I have said, it is easy to see that in my own opinion dengue is a disease *sui generis;* and entirely distinct both from yellow fever and paludal fever,—distinct as to its etiology, its pathology, and its symptoms; and not less distinct, also,

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in the character of the response which it makes to the action of several important remedies.

Whether there is any such antagonism between yellow fever and dengue, as to cause the prevalence of dengue to oppose an obstacle against the progress of yellow fever, I am entirely unable to say. Such an opinion has been suggested, but I am not aware that it has received any definite support from observed facts. Certain it is, that an attack of one of these fevers does not afford to the patient any subsequent immunity against the other.

As to the extraordinary doctrine that dengue is a "spurious yellow fever," and the equally extraordinary doctrine that yellow fever may be modified into dengue "by the protective virtues of carbolic acid;" both of which doctrines have been asserted in Mobile during the prevalence of the recent epidemic, it is not worth while to waste time in any formal refutation of them. I imagine that after my exposure of them in the Mobile *Register;* and still more specially after Dr. Faget's tremendous criticism in the January number of the *New Orleans Medical and Surgical Journal*, neither of them is very likely to be heard of hereafter.

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REPORT ON DENGUE.

BY WM. H. ANDERSON, M. D., OF MOBILE.

Having never seen or treated dengue in any other location than the city of Mobile, I can only give an account of it as I have witnessed it there. We have had several extensive epidemics of the disease in our city, and on the coast contiguous to it. Although it occurred to a limited extent in 1844, yet the first appearance of it in epidemic form was in the autumn of 1850. It was then very general, sweeping over the whole city, while there were occasional cases at all the watering places on the opposite side of the Bay of Mobile. Since that time we have had cases of it every year, and several times it has been general enough to be considered epidemic.

Within a period of twenty-four years I have treated a large number of cases, and I look upon the disease now, as I did when I first became acquainted with it, viz: as essentially a malady in which the nervous system bears the brunt of the attack, and in which the remedies to do good should always be addressed to the impaired nervous functions.

With regard to the *cause* of the disease, we know as little as we do about the cause of the large majority of diseases that afflict the human family. I have never discovered any particular state of the atmosphere or of the weather, that either gave rise to it, or favored its spread in epidemic form. Although it makes its appearance generally in the latter part of the summer and fall, yet I have seen occasional cases in the spring

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and in the winter. It has visited Mobile when I have not heard of it in any other Southern city. In such seasons it has been heralded by no other disease anything like it, but has come suddenly upon us under its own form, uncomplicated with any other symptoms of a departure from perfect health. No unusual barometric pressure has appeared to accompany, or to influence its advent. No telluric emanations that were noticeable seemed to be connected with it. Neither sunshine nor shower differed from other seasons, when we were perfectly exempt from its attacks. That dengue has a cause, and a very potent one, there is no doubt, but what the cause is, remains for the future to develop. The literature of dengue is very meagre and unsatisfactory. Copeland, who seems to have read every thing that had been written on the subject, tells us in his encyclopedia, "that the writers who have described the disease have done themselves little credit."

I am very much inclined to think, however, that the disease in question is accompanied by different symptoms in different localities. This is either the case, or else writers have been content to follow each other in describing certain symptoms which may have once appeared in some early epidemic, but which certainly have not presented themselves to my observation in such regularity as to be considered diagnostic symptoms. Some authors dwell on swelling of the *joints*, and speak of the *eruption* as a constant symptom, occurring on the fifth or sixth day. They speak also of a sweating stage on the third day, after which the fever reappears, and the patient becomes much worse, and suffers with insomnia, restlessness, nausea and vomiting. These symptoms I have not witnessed, certainly not in the succession mentioned. In some epidemics of the disease in Mobile the eruption has been the exception, not the rule. As regards the swelling of the joints, the desquammation, and the arthritis during convalescence, I am quite sure they have not been pathognomonic symptoms in Mobile, while I have been a practitioner.

It is indeed strange that dengue should have assumed so many different phases as are mentioned by intelligent authors

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who have described it in their particular localities. The account of the disease which Dickson gives in such graphic language, does not correspond with the malady as I have seen it in Mobile. The descriptions of dengue given by Arnold of Savannah, Campbell of Augusta, and Fenner of New Orleans, would not enable us in Mobile to recognize our dengue as the same disease which fell under their observation.

Without spending any more time, therefore, on the literature of the subject, let us plunge at once in *medias res*, and analyze a case of this painful malady, and see if we can refer its symptoms to any other portion of the system than the nerves. A patient is taken rather suddenly with pain in some part of the body. It may be the head, it may be in the back, the breast, or the limbs. It is generally in the forehead, and is followed by severe pain along the length of the spine and the muscles of the lower limbs. This pain is referred to the bones, but it is evidently in the muscles, or in the nervous filaments distributed to the muscles. In many cases there is something like a chill, followed by increased activity of the pulse, and a rise of temperature. The skin is hot to the touch; the eyes are injected; in some cases there is a distinct exanthematous eruption over the breast, the face, and occasionally over the whole body. This eruption often fades away and reappears. Its appearance, however, in no way relieves the pain or the fever, and in the majority of cases there is no eruption at all, but only a diffused redness over the face and breast. I have occasionally seen a well defined urticaria. The tongue soon becomes covered with a buckskin fur, but is not particularly dry. The secretion of the salivary glands and of the mucous follicles of the mouth, remains generally normal, though sometimes the Schneiderian membrane, and mucous lining of the stomach and intestinal canal are congested and throw out a secretion. There is little desire for cool drinks. The appetite is lost almost entirely, and no matter how long the attack lasts it is very seldom regained. There seems to be no loathing, but an utter indifference to food. The urine is sometimes scant, and in consequence a little high

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colored, but as a general rule this excretion is natural in appearance and quantity. The skin is almost always dry. There need be no nausea in an uncomplicated attack of dengue, but there often is nausea, because many persons become nauseated whenever fever sepervenes from any cause. The bowels are almost always torpid. Accompanied with the pain in the muscles are a general soreness, and feeling very analogous to that which is experienced from the fatigue of too much bodily exercise. This makes all motion painful, and some patients will be day and night on the back, to prevent the soreness occasioned by simply turning over. This state of things may last from twenty hours to five or seven days, according to the intensity of the attack. The greater number of cases in most epidemics in Mobile last from three to five days, while many run their course in twenty to thirty hours.

I have described here a simple, uncomplicated case of dengue in a person previously well. The party attacked may be of either sex or of any age, from six months to eighty years. In children the convalescence is generally rapid; in adults it is tedious, and in persons over fifty it is exceedingly slow. I have said nothing about the signs or symptoms of dissolution, because I never knew a patient to die of dengue. But the disease almost always comes at a season of the year when the system is impaired and weakened by weeks and months of high temperature; when the secretions are imperfectly performed; when the liver is torpid, and when malarial poison in some of its protean effects has reduced the standard of physiological health. Then, the supervention of an attack of dengue is altogether a different thing. Unfortunately there are many such cases in all epidemics of the disease. Added to the pain and soreness, we now have other symptoms to treat. A fever which was before continued may now become remittent. A nausea which amounted simply to an inconvenience, may become excessive, and give rise to bilious vomiting. A tongue which was neither dry nor much furred, may now become parched and thirsty, and where warm drinks were preferred, cold ones are called for. The urine

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which was natural may be high colored, scanty and scalding. In fact we have a case of dengue with a bilious fever of a mild type engrafted upon it, and the disease requires a superaddition to the treatment.

Leaving this part of the subject for a moment, I must now refer to the cerebro-spinal system of nerves. These are divided into motor and sensitive. Both sets of filaments arise from the brain and spine and are distributed freely to the muscles. The feeling of *pain* is not an exaggeration of ordinary sensation. Beau was the first to establish this fact, and he proved it conclusively by the action of chloroform, which substance annuls pain, but does not necessarily destroy sensation unless pushed to an extreme. Up to the present time, I am not aware that any physiologist has shown the anatomical distinction between filaments that preside over sensation, and those that convey the impression of pain. I think it quite probable, however, that they are separate and distinct. We know that the motor and sensitive filaments are distinct, although in the mixed nerves they cannot be separated by anatomical dissection. I look upon dengue as an affection of the ultimate filaments of the cerebro-spinal nerves after they enter the muscles. The vital organs go on performing their functions as usual, except the heart, which in many cases is a little quickened in its action. Experiment has abundantly proved that the extreme motor filaments distributed to the muscles may be even paralyzed, while the *trunk* of the nerve is not affected by being exposed to the very same poison that paralyzed the ultimate filaments distributed to the muscles. The nervous trunk, for example, that is about to enter into a muscle for final distribution, may be soaked in a solution of woorara, and the muscle receiving its filaments is not paralyzed thereby. It will respond to galvanic stimulus. But if we soak the muscle itself in a solution of the poison, the ultimate filaments come in contact with it and become paralyzed, and will not respond to the stimulus of electricity. Now, as woorara has no effect on muscle, it must be the nerve filaments that have become poisoned, while the trunk itself was not

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subject to its action. All this is mentioned to prove that the filaments supplying the muscles may be extensively implicated, when other parts of the nervous system are intact.

What proof is there that disturbed function of the filaments is the proper pathology of dengue? A good deal that is positive, and some that is negative. There is pain, often lancinating, and soreness that is increased by motion. This soreness produces that feeling of fatigue which we experience when we have overused any particular set of muscles. The nervous action has become exhausted as it were. We have the will to move, but we are restrained by the fear of discomfort. As negative proof, we have the long and tedious convalescence, and the sense of fatigue from ordinary muscular action that lasts for weeks and even months, after recovery from the acute attack. This muscular fatigue, which is altogether owing to functional nervous disturbance, re-acts upon the general system, and produces that anorexia which invariably accompanies the convalescence from dengue. This same muscular fatigue also prevents sleep, the patient feeling as if he were too tired to sleep. With regard to appetite, I have known patients not to recover it until towards the end of winter, when they had their attack in the fall, and this notwithstanding they had been freely supplied with tonics. In fact iron and bitters seem to have no effect here, as they do during the convalescence from other fevers. Brandy and whiskey, on the contrary, on account of their diffusible nature, almost invariably afford temporary relief. Champagne is also an excellent momentary tonic.

I have said nothing about the *blood* in patients suffering from dengue. I do not believe that the blood is seriously impaired; in fact I look upon this fluid as normal throughout the attack. If, at the onset, there is delirium in some patients, it is because there is increased circulation in the brain during the height of the fever, and this occurs to many whenever they have fever from any cause. In cases of pure dengue I have never seen a sign or symptom of blood poison, although I have carefully looked for it, in order to form a correct

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pathological diagnosis. I am aware that some intelligent physicians consider the blood as primarily affected,—consider it as the recipient of the poison, and the cause of all the symptoms and lesions. I cannot agree with them; hence I oppose all theories that would place dengue on the list of malignant diseases, such as yellow fever, hemorrhagic malarial fever, cholera, &c. As to its being allied in any way to *yellow fever*, I can see no shadow of evidence. On the contrary, dengue often invades a district where yellow fever does not. It occurs in localities where yellow fever never yet has gone. Whenever in Mobile there has been an extensive epidemic of dengue, there has been very little yellow fever, and, *vice versa*, when yellow fever has been epidemic we have enjoyed immunity from dengue. How then can we find kindredship for it with that terrible malady which we know disorganizes the blood, paralyzes the heart, and softens the mucous membrane from the fauces to the anus? Yet, as dengue generally makes its appearance about the same time of the year that yellow fever does, and as there are cases of genuine yellow fever about as well as cases of dengue, it becomes important to diagnosticate between the two diseases. There must be some similarity at the onset of the attack, since some intelligent physicians and otherwise acute observers, contend that the one disease is only a modification of the other,—that dengue, for example, is only yellow fever in a milder form. So far as Mobile is concerned, I have noticed that physicians of long experience in the treatment of the two diseases seldom have any difficulty in making out a correct diagnosis, but new comers as a general rule seem to be much puzzled, and it is these latter that look upon dengue as a modified form of yellow fever. It is very true that during the first twenty-four hours, there is often the same array of symptoms, and if small-pox were in the city as an epidemic, it might well be mistaken for dengue at any time in the first twenty-four hours. Other diseases too, are accompanied at the onset by the same symptoms. But after the first day has passed, no mistake in diagnosis ought to be made by a

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physician acquainted with the two diseases. Certainly the symptoms THEN appearing ought not to leave a doubt on the mind as to the identity of the two diseases. The peculiar appearance of the eye, the heat of the skin, the desire for cold drinks, the difference in the nature of the pain, and the general condition of the patient, should be sufficient to mark the case as one of yellow fever. But even, if in certain cases the symptoms of one disease should simulate those of the other, yet the fact that one disease is not dangerous, while the other is very malignant; that the convalescence of one is essentially different from that of the other; and that the effective treatment is entirely different, it appears to me, ought to disabuse the mind of the idea of identity. If my idea of the pathology of dengue is correct, there is certainly a very wide difference between it and yellow fever, as wide indeed as that between ordinary neuralgia and severe gout. Fortunately for the community it makes very little difference, in the large majority of cases during an epidemic of yellow fever, whether they are mistaken for dengue or not, because, as a general rule, the large majority of cases are mild and require little treatment, and *that* treatment is as well adapted to dengue as it is to yellow fever. But woe be to the patient who is going to have a dangerous attack of yellow fever, if his physician mistakes it for dengue, and lets slip the important time for treatment, not discovering his mistake until he sees the beeswing ejection from the stomach, which is almost the sure precursor of genuine black vomit.

It will be perceived, that although I have said the symptoms of yellow fever after the first twenty-four hours, differ from those of dengue, I have not been very particular in describing the diagnostic difference. It is almost impossible to give an intelligible differential diagnosis on paper, of cases that are somewhat like each other in general appearance. The truth is, that the disease called yellow fever, in its mild and severe forms, cannot be learned from books and monographs. Its different phases, symptoms and treatment must be acquired by long and varied experience in epidemics

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of successive years, and the greater number of epidemics the better. If two physicians start together of equal education and equally appreciative minds, and one sees six epidemics while the other sees twelve, the latter would be by far the safer practitioner. No amount of high attainment in animal chemistry, physiology, or therapeutics, can possibly make up for the store of practical knowledge laid up by long experience. The appearance of the dejections for good or for evil; the peculiarity of the eye; the expression of the countenance; the sensation conveyed by the touch; the state of the mental faculties; the diagnostic retching; the nausea; the pains; the response or want of response to certain remedies, and a hundred other symptoms, silent, but two eloquent and expressive to be conveyed to another by human language,—all these things, I say, must be learned in the school of experience by attentive study, often times tortured into us, as it were, by anxious watchings, and by bedside revelations read only in the volume of nature.

As I have referred the pathology of dengue to altered innervation in the voluntary muscles, I may be expected to suggest some manner in which the poison enters the system, and how it spends its force on the ultimate nervous filaments. This part of the subject is more difficult to elucidate clearly than any other. In the first place, we do not know what the poison consists of. If a poison of atmospheric nature, we may presume it to be gaseous, and to enter the system like other poisons from the atmosphere, whether composed of gaseous or of solid particles. We have some negative evidence that it is not caused by malaria, as we generally understand that term, because quinine does not benefit the disease, but rather aggravates it, according to my experience. I have sometimes thought that it might be attributed to some peculiar electric state of the atmosphere, though this is merely speculation. But suppose it to be a gas, inodorous like malaria, it certainly can enter the system as malaria does. There are two ways by which it can spread itself and produce its effects —by means of the blood, and by the nerves. It can be taken

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through the cellules of the lungs as oxygen is, and carried to the nervous centres, there to do the centric damage which may be reflected to the muscles and produce pain; or it may be carried by the blood to the ultimate filaments themselves, and alter their physiological functions. We have proof enough by experiment on living animals, that the filaments at their final distribution may be even paralyzed, without the impairment of the nervous trunks or the nervous centres. It is a fact well known to physicians, that the delicate, odorous particles emanating from certain flowers—the tube rose, for instance—will, in some persons produce syncope, and temporarily stop the beating of the heart. Physiologists are not of accord as to how this sudden and powerful change is wrought. The particles may enter the blood by absorption through the Schneiderian membrane and be conveyed to the brain, and thereby producing molecular disturbance, an action may be reflected to the heart. But in the case of the tube rose, the syncope is so instantaneous, that there is not time for the odorous particles to be carried by the circulation to the brain, so that in this and similar instances the communication must be altogether nervous, and the impression must be conveyed exclusively by the nervous filaments, just in the same way that the sensation of itching is carried to and appreciated by the sensorium. Some of these phenomena are exceedingly curious and replete with physiological interest. Certain persons, for example, are so susceptible to the irritation produced by powdered ipecac, that a jar of that drug cannot be opened in a room where they are present without causing severe sneezing. This sneezing is followed by an attack of asthma with profuse secretion, lasting several days. In such cases, an inodorous particle of microscopic size, affects a nerve, and propagates that affection to other nerves, through the influence of which a considerable secretion is poured out for several successive days. These instances show how a poison may enter the system, and be propagated altogether by nervous influence.

We are led by analogy to suppose that the poison producing

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dengue is floating in the atmosphere, and that it enters the system like the zymotic poisons; but we have no evidence that it disorganizes the blood, or that it interferes with the normal functions of that fluid, beyond the little change produced by the elevation of temperature during the febrile stage. This elevation of temperature is rarely beyond 103° Fah., according to the few observations that I have made with the thermometer. When the temperature in dengue goes beyond 103° Fah., it is probable that bilious fever accompanies the attack. The whole subject of zymotic influence, however, is still very obscure, and we are just getting from the researches of Beale, Sanderson and others, some feeble light to assist us in groping our way through the future.

The limits of this essay will not permit me to dwell longer on this part of the subject, and I must proceed to the *treatment* of dengue. When we are not certain as to the immediate cause of a disease, and especially when we feel that we are not accurate as to its exact pathology, the *treatment* of it, although it may be successful, is very unsatisfactory to the philosophic physician. He is not satisfied with the empiricism, rational though it may be, which too often guides him in the administration of his medicine. He wants something more consistent with the high functions of reason and intelligence. When a patient with a strong heart-beat, a bounding pulse, a turgid countenance, and a brain on the border of delirium, is bled and relieved, the treatment is philosophical. When the pressure of the contents of an abcess gives pain, and it is opened and the patient relieved, that too is philosophical. When ergot is given to control capillary hemorrhage, we know that it acts by causing contraction of the muscular coat of the minute arteries, and thus lessens the capillary circulation. Here also the effect can be traced to the cause, and our reasoning powers are satisfied. But it is far different with the administration of most of our remedies. We have learned their use by experience, and not by a process of reasoning.

The treatment of a case of dengue not complicated with

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other functional disturbance, is very simple. We have only to clear out the intestinal canal, to keep up a gentle moisture of the skin, to relieve the pain and soreness, and to secure rest and sleep. To meet these indications, mild purgatives, gentle diaphoretics, and anodynes are all that is needed. It is, however, exceedingly difficult in many cases to relieve the pain and stiffness of the muscles. The various anodynes, including morphine, often fail. The warm bath would seem to be particularly indicated, but I have received little benefit from it. Since the introduction of chloral, I have used that drug with happy effect, especially to overcome the insomnia. The bromide of potassium also, in thirty and forty grain doses, has acted favorably. I have used electricity by passing the current from the upper part of the spine through the feet, and while it always relieved the pain during the passage of the current, it has never seemed to do permanent good. Sponging the surface with bay rum is grateful and agreeable to the patient, and should be used when convenient. Nitrate of potash is a good diaphoretic, and like the neutral mixture and the spiritus Mindereri, is a good febrifuge. In all cases, where the disease is accompanied with the symptoms of bilious remittent fever, the indications are, to use mercurial purges and to give quinine during the remission. When there is nausea and vomiting, the phosphate of soda used freely is an excellent remedy. In fact, a light bilious attack accompanies the dengue, and the treatment should be varied accordingly. When the fever of dengue, either single or complicated with bilious remittent, has subsided, and the stomach is irritable, and the vital forces below par, champagne is a very grateful stimulant, and may be given as often as the patient desires it. Brandy is also well tolerated, even by persons who in health have no taste for it. The long and tedious convalescence in many cases, calls forth all the resources of the physician to keep the patient in a comfortable condition. The muscles are so weak that any exertion overcomes their power of resistance, and a feeling of lassitude supervenes, which requires absolute rest. After a night of good sleep, the con-

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valescent awakes refreshed and goes about in comparative comfort until the middle of the day. He then begins to feel tired, and instinctively desires a stimulus like brandy, whiskey or champagne. Ale and porter do not seem to have the same effect as the stronger stimulants. Although electricity does no good during the acute attack, it is a most excellent remedy during convalescence, and assists materially in toning up the entire system, especially in overcoming the stiffness of the muscles. The Faradic current should be passed through the whole body, by putting the copper plate against the soles of the feet, and drawing the other electrode over various parts of the back, breast and abdomen. No tonic, however, is so bracing as cold weather, and many who have been attacked even lightly, never regain their strength until the winter sets in. I have known relapses of yellow fever to take place often, and have seen patients have two distinct attacks during the same season; but I do not recollect to have had any patient who had a second attack of dengue in the same summer or autumn. While a *bona fide* attack of yellow fever, however, is in the very large majority of cases a safeguard against a subsequent attack, at least for many years, dengue, on the contrary, may seize upon the same person every year, or at least every season when the disease is prevalent.

I might say much more, but I do not deem it important to do so. I present these views, fully aware that the pathology I have indicated, and the treatment I have recommended, are somewhat unsatisfactory and imperfect; but they are my convictions after an attentive study of the disease, through many of its phases, embracing a period of a quarter of a century.

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CHOLERA IN BIRMINGHAM, 1873.

BY M. H. JORDAN, M. D.

In performing the duty imposed upon me, of reporting a history of the recent epidemic of cholera as it prevailed in Birmingham in 1873, I will confine myself strictly to a simple, concise and true narration of facts.

Our little city was terribly scourged for many long weeks; our citizens became panic stricken; many left, almost depopulating the place, and leaving the sick and indigent principally in the care of the ministry and physicians.

Even members of the medical profession did not escape, for two of our physicians lay upon the brink of the river for many weary days and nights, but by the kind intervention of an All-wise Providence, and the assiduous care of devoted attendants, they were restored to health and usefulness.

Birmingham is situated in Jones' Valley, near the centre of Jefferson county, with the Red Mountain lying a short distance to the south and east, and what is now called Reservoir Ridge to the north and west. The stone near the surface is blue limestone, covered with a stiff clay soil, such as is usually found in the hilly portion of Central Alabama. A few words in regard to the geological formation of this valley and vicinity is, I think, worthy of consideration in connection with this subject. The bed of this valley is formed by the old silurian formation of limestone, which doubtless was brought to the surface through the superincumbent strata, and is found throughout this entire vicinity, almost on edge, dipping as we

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recede from the valley to the north-east and south-west. From this fact we are led to conclude that the only water that appears on the surface or is found in wells in this valley, must be surface or seap water, because the strata of limestone are not water bearing, and only afford such supply of water as may have filtered through the stratum of earth overlying the edges of this formation during the winter or rainy months, which finds a ready outlet in a south-west direction, along the line of upheaval. This water finds numerous summer outlets at various points in the valley; all of which, with others north-east and south-west of Birmingham, are situated on the line of that upheaval. The ground upon which Birmingham is built is undulating, with many elevations and depressions, in some places affording fine natural drainage, in others low and marshy, which remain more or less damp throughout the entire year. The water supply during last summer was obtained from the *reservoir* by the wealthier class of citizens, but the poor were compelled to haul it in barrels from springs, at the foot of Red Mountain, or use from several wells and springs in the city limits, that are usually situated in low places, where at every rain they receive the washings from a large surface of ground. There is one fact connected with the water supply of this place, that I think is worthy of mention at this point, and that is, on the south side of the railroads the inhabitants are liberally supplied with good and pure water, from springs or wells, but on the north side this is not the case, for as yet we have been unable to obtain any good water by means of wells, which necessitated the building of water-works. In the eastern portion of the city, there is a pond, from which flows a small branch, which takes a westerly direction, crosses 20th street through a culvert, and continues in the same direction to the corner of 17th street and 2d avenue, where it unites with two other small branches from the south side of the railroad.

At this junction, these several small streams spread out into a low, marshy ravine which, overgrown a portion of the year

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with tall grass and weeds, continues on the same line through the entire limits of the corporation.

On the northern side of this ravine, from 11th to 14th streets for some distance to the north, a large number of shanties and hovels are built, usually low upon the ground, no provision being made for ventilation beneath. This portion of the city and these hovels were occupied by negroes, and were generally kept in an exceedingly filthy condition. Along this same ravine was a low, small, surface spring, which the inhabitants of Negrotown used for drinking purposes.

The sanitary condition of this place was deplorably bad, produced, no doubt, by having recently graded the streets and built water-works, which necessarily caused a large amount of fresh earth to be thrown to the surface. I am sorry to say, that until the alarm of cholera was sounded in our streets, no effort on the part of our city authorities had been made to clean the streets and alleys, nor to drain the cesspools and damp, wet places; neither had the privies and stables received proper attention.

From the most reliable facts in my possession, the first case of cholera that occurred in this city, was that of Mr. Stellar, who was taken sick on the 2d day of June, and died in twenty-four hours. He was an able-bodied laborer, had been here about six weeks, and had his bed and bed-clothes shipped to him from Huntsville a few days before he was taken sick. The origin of this case was somewhat obscure, but as cholera was prevailing in Huntsville at that time, and this was the only known means by which he could have taken the disease, I came to the conclusion that his bed and bed-clothes were infected in Huntsville, and he contracted the disease from them. When Mr. Stellar was taken sick, his physicians had no suspicion that he had cholera, although his symptoms very much resembled it, as there had been no cases in this section. No care was taken to disinfect the discharges, which were thrown on the ground in the rear of the house, on the slope of the hill immediately above the branch, which at every rain

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received the washings from the privies, stables and out-houses on the north side of it.

There were no more cases until the 7th day of June, when Miss Hughes and her little sister were taken in a few hours of each other, and died in twenty-four hours. These poor people lived in a miserable little hovel near the edge of a small branch which runs through several acres of low, marshy, wet ground. Doubtless these parties were infected from Mr. Stellar, as I learn that Mr. Stellar was a frequent visitor at Mr. Hughes', and that members of Mr. Hughes' family were at his house during his illness.

The discharges from these patients were thrown into the branch in the rear of the house, which flows down to 13th street within a few feet of the low, surface spring, that was used by the inhabitants of Negrotown for drinking water. On the 9th day of June, Mr. Bennett, a shoemaker, who slept and worked in the second story of a brick house, was taken sick and died in eighteen hours. He had been absent from home several weeks, and came from Chattanooga the night before he was taken sick, with a diarrhœa. The house that this man died in, had a cellar underneath it, that had been inundated several feet in water, for three or four weeks last spring, and consequently was damp, and in an unhealthy and filthy condition. The dejections in this case were disinfected with carbolic acid, and burned with the bed and bed-clothes. On the 10th day of June, Mr. Straub, who worked in the shop with Mr. Bennett, and waited upon him and carried out the discharges, was taken in the same room and died in twelve hours. The discharges in this case were disinfected and buried. On the 11th day of June, Mrs. Bennett, a sister-in-law of Mr. Bennett, who nursed and was constantly with him until his death, was taken sick at her cabin, and died in twenty hours. The discharges in this case were thrown into the branch in the rear of the house.

On the 12th day of June, John, a negro boy, was found in a low, dirty shanty close by the A. & C. R. R., in a state of collapse, and died in a few hours. In the evening of the same

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day, I was called to see Tom Edwards, (colored) at No. 8, on the bank of a small ravine, and found him with the symptoms of a well marked case of cholera, but by timely treatment and good nursing, reaction was produced in a few hours and he rapidly recovered. This was the first case that I have any knowledge of, that recovered. The discharges of this case were at first thrown into the branch in the rear of the cabin, but after I saw him, they were disinfected with carbolic acid and buried. On the 13th day of June, I was called to see Jim Eubank, (colored) at the residence of Wm. F. Nabers, and found him with copious rice-water discharges, cold skin, small, frequent pulse, and cramps in the bowels and extremities, but by proper attention he recovered.

I took especial care to keep this boy isolated from the rest of the family, and had his discharges disinfected with carbolic acid and buried, and there was no other case developed on the premises. In connection with this case, I would call your attention to the fact, referred to in the beginning of this report, that the citizens in this locality were abundantly supplied with good water, and this was the only case that occurred in that immediate neighborhood. On the same day there were several cases reported in Negrotown, in the family of Gabe McLaughlin, and died in twenty hours. The discharges in these cases were deposited on the ground in the rear of the house. After the occurrence of these cases the disease began to prevail as an epidemic in Negrotown, and there were deaths in every household. At first, all of the negroes in this portion of the city, who took the disease, invariably died in a few hours, but when the violence of the epidemic began to subside, many of them recovered under proper treatment. Along the branch there were a number of shanties, in close proximity to where Tom Edwards was taken sick; and on the 16th of June, Minerva, a colored girl, who waited upon Tom Edwards, and carried out the discharges, was attacked at No. 11, and died in ten hours. Before this girl died, two other occupants of the same cabin were taken and died in a short time.

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The discharges in these cases were disinfected and burned with the bed and bed-clothes and cabin, by order of the Board of Health. A short distance up the same branch, there were a number of cabins where the inmates suffered so severely, that some died and the others left the house, which was in a like manner consumed by order of the Board of Health.

On the 18th day of June, Mr. Hughes, the father of the two girls who died at No. 2, on the 7th day of June, was taken and died next day, making three deaths in this house out of five in the family. On the 20th day of June, the profession declared the disease to be epidemic over the entire city, and after this date I am unable to give, step by step, a definite history of the progress of the disease, for it became so general, and raged with such violence, that our physicians were unable to keep a record of their cases. On the 27th of June, Mr. Nabers, who clerked in this city during the day, and slept at his home in Elyton, a distance of two miles, was attacked with cholera and died in twelve hours. The dejections were disinfected with carbolic acid and buried, and there was no other case developed in that village. On the 5th day of July, Mrs. Hale had slight symptoms of diarrhœa and concluded to go to her father-in-law's, on the top of Shades Mountain, about eight miles in the country. The next day she was taken with cholera and died in twenty-four hours.

Her mother-in-law, who waited upon her attentively and was constantly in the room with her, until her death, took the disease in two days thereafter, and died in twelve hours. The discharges were received upon clothes, and at first were merely washed out in water, which was thrown upon the ground in the back yard, but after a physician reached the place they were disinfected and buried, and the bed and bed-clothes burned. There were no other cases in this family, although several members of the household were more or less affected with a diarrhœa for several days. In an elevated portion of the city, Col. T. had a cistern of excellent water, which his family used exclusively. This accomplished and generous hearted gentleman, hearing that cistern water was

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more healthy and that persons using it were less likely to contract the cholera, threw open the doors of his cistern and invited his neighbors to get as much water as they needed.

Notwithstanding this elevated locality and the people favored with pure cistern water, they suffered as severely, if not worse, than any other portion of the city.

On the 8th day of July I was called to see Anderson, (col.) a hackman, at the residence of Col. T., and found him with all the symptoms of a well marked case of cholera. I prescribed for this patient, and returned to see him twice during the day and found him apparently doing well; reaction had taken place, and at my last visit I found him able to sit up. I learned that during the night this boy went to the cistern several times and drank as much water as he desired; and when my attention was called to him next morning, he was going rapidly into a state of collapse, and died in a few hours.

On the same day Col. T., his wife, and several members of the family, were affected with diarrhœa. I prescribed for them all; but Mrs. T. fearing that the medicine might injure her suckling babe, concluded to take *Simmons' Liver Regulator* instead. All this family escaped the disease, except Mrs. T., whom I found on the 9th day of July with a regular attack of cholera. A few days before this lady was taken sick she was exposed to the disease by washing and dressing Mrs. K., who died of cholera. I remained with this patient all night, and succeeded in getting a reaction before day, and she seemed to be convalescing for several days; her dejections were of a bilous character and the secretion of urine well established; but from some unaccountable cause she died on the fifth day.

The remarkable exemption at the Relay House, the most popular hotel in the city, when the disease prevailed extensively on both sides of it, is difficult to account for, but may in part be explained by the facts that the house is built upon pillars several feet above the surface soil, allowing ventilation beneath, and the drainage and water supply was better than in most other localities, and the proprietor spared neither

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time nor expense in having his premises well policed and disinfected.

Two facts were universally observed by the profession in connection with this epidemic that I am unable to account for on plausible grounds, which I will mention simply for what they are worth, viz: whenever the wind came from the south and east the disease seemed to increase in violence, the mortality was greater, and a larger number of cases was the result; but when the wind blew from the north and west there was a moderation in all the bad symptoms for the time being. Every shower of rain apparently aggravated the disease *so much* that not only the physicians, but the intelligent class of citizens, looked upon every approaching shower as ominous of increased danger.

As I learn that it has been stated by members of the medical profession of high standing, in different portions of the State, that the disease that prevailed so extensively in this place was not cholera, I think that it is nothing but proper to give the symptoms of the disease as I observed them. The patient was generally seized with nausea, faintness, and a feeling of oppression in the precordial region; also, griping pains in the abdomen with frequent watery discharges resembling rice-water in appearance. There were constant vomiting, suppression of urine, and profuse cold perspiration; there was a loss of elasticity of the skin, and the skin of the hands and feet was shrivelled and had a dusky hue. The eyes were sunk, the features pinched, and cramps were felt in the limbs. A difficulty in breathing, intense thirst, excessive restlessness, a rapid, small pulse, and suppression of the voice were uniformly present. The external surface was cold and of a livid hue, and a peculiar, sweetish, sickly odor was exhaled from the breath, body and dejections.

In regard to the treatment of this disease, I shall allude to only a few points. First, I believe that opium and mercury in some form are the sheet anchors, especially in the primary stages, but in the advanced stages when the stomach is so inactive that nothing seems to make any impression upon it

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I have found a stimulating emetic to answer a better purpose, and produce more satisfactory results than any other mode of treatment. The emetic that I used was composed of mustard, salt, pulverized ginger, and capsicum, suspended in hot water, which in many cases aroused the stomach to action and produced a warm glow over the entire surface in a few minutes. For the relief of that troublesome complication—cramps, I wish to call your *especial* attention to a simple remedy, which I found to give perfect relief in every case in a short space of time. After trying stimulating frictions, sinapisms and the hypodermic administration of morphine, with but little benefit, I was led to apply a number of dry cups, (with the ordinary tumbler,) along the spine, from the occiput to the sacrum, and let them remain ten or twelve minutes, which produced the desired result and relieved every case in which they were applied. In Prof. Austin Flint's excellent work on the practice of medicine, he states that in the epidemics of cholera of 1849 and 1852, he was daily attending as many patients as his physical strength would admit, and during that time he prescribed for a large number of people for the premonitory diarrhœa, but not one of that number had cholera. I am glad to be able to say that I can add my *limited* experience to that of this learned author, for not a single case that I treated for the diarrhœa, where the precautions were observed and directions carried out, had an attack of cholera. I am so profoundly impressed with this belief, that I think I shall never feel any uneasiness for my own personal safety in another epidemic of cholera; for with the proper precautions and good hygienic regimen, cholera attendants may enjoy the most perfect security from infection. I see in the works on the practice of medicine by Reynolds and Aitkin, also in an article in the American Practitioner for October, 1872, by Dr. L. P. Yandell, Jr., that cholera patients should be allowed ice and ice water *ad libitum*. From close observation, in the epidemic, as it prevailed in this young city, I cannot corroborate the views of these learned gentlemen, for in almost every instance where the patient was per-

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mitted to gratify his intense thirst, a fatal result supervened in a short time. From my limited experience with this disease, as it prevailed in Birmingham, I think that the patient should be given ice and ice water, in moderation, small quantities at short intervals, but in no case to overload the stomach at any one time. We had many cases complicated more or less with *uræmia*, from which several died, although they were carefully and persistently treated with the most stimulating diuretics for the restoration of the secretion of urine with no effect.

Neither age nor sex were respected by this epidemic, for our people, from the suckling babe at the breast to extreme old age, suffered alike from its ravages. Gentlemen, in closing this brief and unsatisfactory report, I wish to state that from a *limited* observation of facts I do not believe that any local condition of the soil, or peculiarity of climate, or moisture of the atmosphere, or masses of decomposing debris, either animal or vegetable, can, in and of themselves, produce the specific poison of cholera, but they are the hot-beds, in and on which the cholera excretions having been placed, the poison is reproduced with fatal rapidity.

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CHOLERA IN HUNTSVILLE, 1873.

BY J. J. DEMENT, M. D.

Huntsville is situated at the base of the last western spurs of the Cumberland Mountain, ten miles north of the Tennessee river, and eighteen miles south of the Tennessee and Alabama State line. It has an elevation of 692 feet above tide water at the city of Mobile, latitude 34 degrees, 43 minutes, 44 seconds. In 1870, it had a population by the United States census, of 4,907; of which 2,532 were white and 2,375 negroes. There has probably been little change since that time.

The character of the surface of the earth, upon which the greater portion of the city is built, is such as to afford abundant drainage, being supplied with natural water sheds, which prevent the water from collecting in that portion of the city. The surface soil is a dark rich loam, with a sub-soil of pure red clay, resting on a solid limestone base. This portion of the city is well supplied with water, mainly through hydrants from a large spring, which bursts from the base of a bluff of limestone, upon which it is built. This water is pure limestone. Many families are supplied with pure freestone water from wells dug into the clay to the depth of from 30 to 60 feet. Descending gradually, about 80 feet from this high and well-drained portion of the city, in all directions except easterly in the direction of the mountain, we have a low, flat, ill-drained region, in which there existed many years ago, a great number of ponds and marshes, which have been gradually

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filled by washings from the adjacent elevations, as well as from the debris from the older parts of the city, which have been cast into them from time to time. Many of these places still exist, and during an unusually wet season, retain water until mid-summer, rendering the people living there subjects of malarial diseases. This made soil, in many places, is from one to five feet deep, beneath which is, at some places, a yellow, gravelly sub-soil; at others, a white or red clay; all of which is much more porous than the sub-soil of red clay in the higher parts of the city. The colored population preponderate here, and occupy tenement houses built near the ground. The water is freestone, and furnished from wells dug to the depth of from ten to thirty feet, which, during the spring and early summer of 1873, were filled to the surface with water, which siped into them from the earth in which they were dug.

The Memphis and Charleston Railroad runs along the western border, and has two daily passenger trains from Memphis and Chattanooga, and indirectly two trains from Nashville, Tennessee. The Railroad shops for the eastern division of that road, are located here. All the trains, both freight and passenger, change officers and men at this point. Previous to the outbreak of cholera last summer, it was observed that we had an unusual number of intestinal diseases, generally of a mild form, and during the prevalence of cholera and subsequent to its disappearance, it was also observed that we had much less of those forms of disease generally regarded as having their origin in malaria,—such as remittent, intermittent, and pernicious fever,—than we usually have at that season.

It has been found impracticable to make a meteorological table for the year 1873, as no reliable observations of that character have been made by any one in the city, within the past few years.

For several weeks prior to the first death from cholera in our midst, the disease had been prevailing in Memphis, Nashville, and many of the smaller cities and towns in Western and Middle Tennessee; and under the direction of the Board

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of Health, which had just been appointed, the city authorities had the city placed in as good hygienic condition as was possible in so short a space of time.

Near the centre of the low, flat region on the western side of the city, about one hundred and fifty yards from the Memphis and Charleston Railroad depot, and on the main street leading to the business portion, the *first case* of cholera occurred in the person of a negro girl, five years of age, child of Toliver Thompson. The family consisted of a man, his wife and five children, who had, for many years, lived in that vicinity. They had no boarders, very few visitors, and remained at home very closely. The man's occupation was that of a day laborer for the city corporation, and he was, at this time, engaged in driving a cart, removing debris from the streets. Immediately south of the house in which they lived, there was a pond, which had been partially filled, but yet contained a considerable quantity of dirty, filthy water, with no outlet. Almost on the brink of this pond was located the well which afforded the water supply for the family, and was at that time filled to the surface with water, which *siped* into it from the pond. On the morning of June the 3d, the girl was attacked with a watery, easy and odorless diarrhœa. At 10 o'clock she commenced to vomit colorless water, and her mother says she became cold, was very restless, and had intense thirst. No medical aid was obtained until 5 o'clock P. M., when she was seen by Drs. H. W. Bassett, H. A. Binford, L. D. Carter, and the writer. She was then *in articulo mortis* and died in a few moments. The hands and feet were shrivelled, and the surface very much sunken. The leaden hue of a cholera corpse could not, in this case, (it being a negro) be observed.

Second case.—Joe Smith, negro, aged 24 years, had been for several months prior to his return to Huntsville, two weeks previous to his attack, a waiter in a restaurant in Decatur, Alabama. During this time he had no particular home or business, slept wherever night overtook him, and took a meal wherever he could get one. He was taken with diarrhœa on the night of June 15th, had no medical aid until 9 A. M. June

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16th, when Dr. Binford found him in collapse, and he died during the succeeding night, in a house across the street from the house occupied by the family in which the first case occurred.

Third case.—Mrs. Susan Pollard, aged 74 years, residence one and a half miles in the country, immediately on the line of the Memphis and Charleston Railroad. She walked to town on the morning of June the 14th, and remained with her children, within one square of the houses occupied by cases Nos. 1 and 2, until the afternoon of the 15th, when she returned home on foot, walking down the railroad track and getting very wet from rain on the road. On her arrival home she was very much fatigued, had slight diarrhœa on the 16th, was worse on the 17th, collapsed on the morning of the 18th, and died the succeeding night.

Abner Graham, aged 45 years, whose residence and store house were immediately south of the *pond*, described in connection with case No. 1, sickened on the morning of the 19th and died on the 21st. Two other members of his family had the disease in a few days afterwards, and recovered. Larkin Easter, a negro, aged 26 years, who waited on Mr. Graham and assisted in shrouding his corpse, took the disease on the night of the 21st and died on the morning of the 22d, at 8 o'clock. On the same day, a negro child, living in the house in which Joe Smith died, contracted the disease, and died in six hours. From this time we find it impossible to report the cases as they occurred in this portion of the town, but we find by inquiry and investigation, as well as by personal observation, that the disease soon became general in that locality, attacking alike both white and black, extending in all directions from the residence of Toliver Thompson, where the first case occurred. Taking this house as a center, and describing a circle of 400 yards in diameter, we find that forty or fifty cases occurred within the space of ten days from the development of the second case—that of Joe Smith.

On the 16th of June the disease was introduced into the

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eastern portion of the city, through the person of Lewis Harris, mulatto, aged 50 years. He was the proprietor of a drinking saloon, near the center of the city, which was a great resort for negroes from all portions of it. On the morning of the 16th he was taken with the disease at his saloon, and was immediately removed to his residence in the eastern portion of the city, known as "Georgia," inhabited almost entirely by negroes. This region has the same physical characteristics as the western portion, the same defective drainage, the same kind of water supply, and the same kind of ponds and marshes. He was collapsed in the afternoon, reacted during the night, slowly recovered, and was declared quite convalescent on the fourth day. On the 23d five negroes, who lived across the street from his residence, sickened and died within thirty-six hours. At this time the use of water from the wells was forbidden by the city authorities, and the people were supplied with water from the spring, conveyed to them in wagons. This was kept up for one week, during which no other case occurred. The negroes then felt themselves secure and resumed the use of water from the wells. Within four or five days after, six other cases occurred in the same vicinity. The use of well water was again discontinued, with the apparent effect of again staying the progress of the disease, as there were no other cases.

When it became generally known that cholera was epidemic in our town many citizens removed to the country with their families. Among whom there were six cases of cholera. One gentleman sent his family to his plantation, ten miles in the country. After remaining there three weeks they returned to Huntsville, remained two days, and again returned to the country. Six days afterwards a little boy contracted the disease, and died in a few hours. A lady, 50 years old, took the disease the same day and recovered. The whole family then returned to the city and all, both white and black, were affected with cholera, but only one of them died. None of the

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workmen, or their families, who lived on the plantation and remained at home, contracted the disease.

Forty or fifty persons removed to "Monte Sano," a mountain, four miles east of town, with an elevation of 1,140 feet, among whom there were three cases—one within seventeen days after their removal, one in twenty-three days, and one in two days,—of these one died.

Some of our citizens took refuge at "Johnson's Wells," a watering place, nine miles north of Huntsville. There were, at the time, about ninety visitors there. One of them was taken with cholera at the Wells—a gentleman who had left Huntsville two weeks previously. He died after an illness of thirty-six hours. There was no other case among the visitors.

A negro woman, who lived six miles in the country, came to town to visit her daughter who was ill with cholera, remained three days and returned home. On the 6th day after her return she was stricken with the disease, and died. On the plantation were about sixty persons, among whom no case of cholera occurred.

The high and well drained portion of the city remained almost exempt from the disease, only eight or ten cases having been reported, and only two deaths. With these exceptions, all the cases were in those portions where existed defective drainage and other local causes above referred to.

During the prevalence of the epidemic we had every form of the disease, from slight borborygmi, with watery, easy diarrhœa, to the most malignant type, which terminated rapidly in collapse and death. Under these circumstances it is impossible to give more than an approximation to the number of cases. We have, however, reports of about one hundred and fifty cases, so well defined as to leave no doubt as to their true character. There were fifty-one deaths. Of these seventeen (17) were white and thirty-four (34) colored. Very nearly all of the cases which terminated fatally were found in the stage of collapse by the attending physician, when first called to see them. Only four cases are reported as having

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recovered from that condition. The disease was found to be very amenable to treatment, when seen by the physician in the early stages. The last case which was reported was on the 29th of July.

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THE WHITE BLOOD-CORPUSCLE,

IN HEALTH AND IN DISEASE.

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CONTENTS:

What is a White Blood-Corpuscle—Chemical Analysis—Physical Analysis—Protoplasm—The Doctrine of Cells—Digression on Amœba—The Origin of the White Corpuscle—The Movements of Leucocytes—The Physiological Relations of the White Blood-Corpuscle—The Metamorphoses of Leucocytes—The Mystery of Reproduction—The Development of the Ovum—Development of the Blood-Corpuscles in the Fœtus—Explanatory Note.

WHAT IS A WHITE BLOOD-CORPUSCLE?

This is the first question that presents itself for solution in the course of our investigation; and I may say of it that there is no more important question than this in the whole of the broad realm of philosophical biology.

As its name indicates, the White Blood-Corpuscle is a common constituent of the blood of animals. It will be well, therefore, if we inquire briefly into the composition of the blood; and we may make this inquisition with reference either to its chemical, or to its physical, or to its vital constituents and properties.

CHEMICAL ANALYSIS.

In ultimate chemical analysis we know that we must find in the blood all the elementary substances which enter into

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the composition of all the tissues and organs of the animal body; and this for the reason that the blood is the common source whence all the tissues and organs of the animal body derive the materials upon which they live and grow.

Some sixty-five elementary substances are now known to science; and of these eighteen have been found in the human body; only ten or twelve of which seem to be essential to the integrity of the organism, so that the remaining six or eight may be regarded as accidental impurities. Since elementary chemistry is only incidentally useful in the study of the phenomena of living things, it is not necessary to my purpose to make any special mention of these elementary constituents.

In proximate chemical analysis we find that the blood consists chiefly and essentially of complex compounds belonging to the class of albuminous colloids. I have made use here of a very important formula of words, namely, the expression "albuminous colloids." Let us pause for a moment, until the full meaning of it has time to find its way into our minds. What is albumen? and what is meant by colloid?

There are two principal and correlative classes of chemical substances—the class of colloids and the class of chrystalloids. You must know in a general way, that the matter which is destitute of life—the matter out of which inorganic nature is made,—is chrystalloid; that its forms are simple and definite, admitting of easy geometric measurement; that its molecules are comparatively incomplex combinations into comparatively stable aggregations of comparatively small numbers of atoms,—two or three or four, or at most a dozen or a score. You must know also that the matter which lives —the matter which moves, and grows, and thinks, and out of which is builded the bodies, fearfully and wonderfully made, of all the tribes and families of living creatures, is albuminous and colloid; that its forms of aggregation are not obedient to geometric laws; that its molecules are composed of comparatively large numbers of atoms, to be counted by scores, by hundreds, and by thousands, moulded into complex and unstable collocations; and that by virtue of their complexity

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and instability these colloid combinations are prone to transmutation and metamorphosis, are hence fluent and capable of living.

Of the organic colloids we may take albumen as the most familiar representative. It is found in almost perfect chemical purity in the white of the hen's egg. One of the simplest formulæ for albumen, that of Lieberkuhn, gives its composition as C72 H112 O22 N18 S1. This would give 225 as the number of atoms in the molecule; and 1612 as the molecular weight; but there are reasons for believing that the true formula is some multiple of that proposed by Lieberkuhn; and that the true molecular complexity is therefore far greater than that which I have indicated.

PHYSICAL ANALYSIS.

The albuminous colloids are present in the blood both as soft solids and as viscous fluids, as is evident from physical analysis. Take the blood of a human creature, or of any of the higher animals, and to the unassisted sight it presents the appearance of a red, viscous, homogeneous liquid. But microscopic examination shows that it may be divided into two parts—the one liquid and the other solid; and that these are very nearly equal, each to each, in quantity. The liquid portion consists of water and soluble albumen. The solid portion consists of granules, red corpuscles, and white corpuscles, all albuminous colloids.

The *granules* have not been adequately studied. They vary greatly in size, ranging from the one hundred thousandth of an inch, to the twenty thousandth of an inch, or even more, in diameter. Some observers have regarded them as particles of fat, some as protoplasmic masses forming the initial stages in the development of the larger corpuscles. There can be little doubt that both opinions are correct; that some of them are of the one character, and some of the other.

The *red corpuscles* are very numerous, there being in human blood, according to the common estimate of physiologists, from three hundred to five hundred times as many of these as

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of the white corpuscles. Vierodt estimates 5,000,000 of red corpuscles in one cubic millimeter of the blood of a healthy man, which is equivalent to 8,000,000,000 in a cubic inch of the same blood. What unimaginable multitudes then must swarm in the fifteen or twenty pounds of blood which circulates through an adult human organism! In shape, the red corpuscles of man are flat, circular discs, with a longer diameter averaging about one-3500th of an inch, and as horter diameter averaging about one-seventh of this extent. Functionally, they are organs of respiration. They carry the life-giving and life-destroying oxygen from the lungs to the tissues.

A summary account of the natural history of the red blood-corpuscles—of their origin and destiny, and of their behavior under different circumstances, would be full of interest; but it is too large a theme for incidental treatment, and I must pass on to the proper subject of my essay, namely, the White Blood-Corpuscle, which is the last of the morphological elements of the blood in the order in which I have named them, but perhaps the first of all in real philosophic interest and importance.

The white corpuscles of human blood were first definitely distinguished from the red corpuscles by Hewson in 1777, that is to say about one hundred years ago. They are ordinarily described as spherical and granular masses, albuminous and colloidal in composition, and of somewhat greater size than the red corpuscles, being of an average diameter of about one-2500th of an inch.

You will have observed that the morphological elements of the blood have been described as of definite and geometrical shapes,—the red corpuscles as circular discs of peculiar contour, and the white corpuscles as granular spheroids. They are so described and so figured in almost all of the physiological text-books of which I have any knowledge. But such description is very far from giving expression to the whole truth; for the red corpuscles often exhibit themselves as mulberry or stellate masses; and the white corpuscles during their career of vital activity can not properly be said to have

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any shape at all, distinguishable in member, joint, or limb. Only when they are dead, or when they are quiescent under the influence of circumstances that interfere with the discharge of their normal functions, do their soft bodies become globular, and correspondent to the common descriptions and figures.

As the result of recent investigations the white corpuscles have been invested with properties and powers of such unexpected and comprehensive character as to necessitate the revision, and even the entire reconstruction, of many of the most important of physiological and pathological doctrines.

We know now that the white corpuscle is not simply a geometrical solid, granular and spheroidal, except when it is dead or dormant; that it is not a comparatively unimportant constituent of the animal body, without any definite physiological history, and without any special work to do in the economy of animal life. On the contrary, in current biological speculation, it has risen not simply to a position of comparative importance, but to a position in which it overshadows all other anatomical and physiological elements. The stone so long rejected of the builders has become, indeed, the chief of the corner,—the foundation stone upon which must be constructed the whole edifice of the physiology of the future.

Let us see, then, if we can get some adequate conception of what this marvellous physiological factor is.

In composition it is albuminous and colloidal. This much we have already settled. It is a mass of living protoplasm—a lump of animated jelly, colorless, translucent, homogeneous, without shape, and without ascertainable structure. It is the typical animal cell in its highest and freest development. It eats and drinks and grows. It breathes and lives and moves. It is obedient to the primal mandate, and multiplies its generations under the sun. In very truth it is a living creature. It belongs to Hæckel's kingdom of the Protistæ. It is allied to the amœbæ. *Yea, verily, it is an amœba;* but an amœba of marked characteristics, one of which is that it has its habitat in the fluids of living bodies, another, that it lives not

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for itself but for the service of the bodies in which it is found.

In order that this summary description of the white corpuscle of the blood may be adequately understood, I must give some account of the modern doctrine of protoplasm; some account of the modern doctrine of cells; and some account of the natural history of the amœba.

PROTOPLASM.

Protoplasm has been defined by Mr. Huxley, as the physical basis of life. It is the living matter of living creatures; the matter through whose agency all their tissues and organs are constructed; the matter through whose marvellous endowments all their vital functions, such as growth, development, movement, metamorphosis, and reproduction, are accomplished. This thanmaturgic matter of life is always and everywhere of the same nature. The most refined methods of chemical, physical, and physiological analysis have not enabled us to distinguish the protoplasm of animals from the protoplasm of plants. It is soft, transparent, colorless, homogeneous, and without any of that differentiation of parts which constitutes structure. It is the same living matter that I have already described as albuminous and colloidal. But it must be remembered that some colloids are not albuminous; and that although all of the albuminous colloids are closely allied to living matter, and for the most part the product of vital processes, it cannot be claimed that they are all endowed with life. It must also be remembered that not all of the matter found in living creatures is in any rigorous sense, living matter. In all those parts of the organism which exhibit recognizable structure some of the protoplasm has been transformed into something else; something which still serves the uses and the ends of life, but which has in itself no power of motion,—no power of growth,—no power of reproduction; and which therefore can hardly be called living.

The two kinds of matter here indicated have been distinguished by Dr. Beale, the first as *germinal matter*, and the second as *formed material;* the germinal matter, which he

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also calls bioplasm, corresponding to the living protoplasm, and the formed material to the protoplasm which has passed into the structural elements of the tissues and ceased to be truly living.

The demonstration of protoplasm as the one sole form of living matter in all the kingdoms of organic nature, and the origin of all the tissues and organs of plants and of animals in the multiform metamorphoses of protoplasm, is the most important achievement of contemporary physiology. It is indeed to physiology what the law of gravitation is to astronomy; and furnishes the key to all the puzzling problems of organization and development. The discovery has been delayed for a very long time because the investigations leading to it have been attended with many difficulties. Of these, two may be specially mentioned here: first, that living protoplasm presents itself only in microscopic masses of extreme minuteness, so that the study of it is necessarily restricted to microscopic experts; secondly, that in the bodies of all living creatures, except the very lowest, it is intermingled in every variety of complex combination with the formed material of the tissues which it animates, so that it is not easy to disentangle the two sorts of matter for separate examination.

The current doctrine of protoplasm has consequently been of slow growth. The name was first applied to the soft semi-fluid contents of the vegetal cell, and especially to that portion of the contents of the most highly organized type of the vegetal cell which lies between the neucleus and the primordial utricle of Von Mohl. Afterwards the neucleus and the utricle were shown to be of the same nature with the rest of the contents of the cell, and were included under the same designation. In 1835, Dujardin applied to the simple contractile substance of those infusorial creatures which are found at the bottom of the animal scale, the name of *Sarcode*. In 1861, Max Schultze asserted the close correspondence of this sarcode with the contents of the cells of the higher animals; and his subsequent researches, together with those of Unger, Brucke, Hæckel, Kuhne, Huxley, Beale, and other work-

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ers in the same field, very soon resulted in the complete identification of the sarcode of animals and the protoplasm of plants; and in the scientific demonstration of that most prolific of biological conceptions,—that living matter is always and everywhere of the same identical nature,—the same in its chemical constitution, the same in its physical properties, the same in its vital endowments.

THE DOCTRINE OF CELLS.

Concurrently with the elaboration of the modern doctrine of protoplasm, and indeed as a subsection of the protoplasmic theory, has been elaborated also the modern doctrine of cells, and of the cellular composition of all living structures.

The doctrine that animals and plants, however complex their organization, are still really composed of a small number of elementary parts constantly recurring, dates back to very ancient times, and was expounded with more or less clearness by Aristotle, by Galen, by Fallopius and by many others of the older anatomists. But the "simple parts" of the ancients, such as bone, flesh, cartilage, ligament, membrane, etc., do not correspond to the cells of the present day. The older observers regarded them as simple, not because they had really arrived at parts no longer analyzable, but because the imperfections of their instruments made further analysis impossible to them. It was not until the introduction of the compound microscope into the investigations of physiology that it became possible to add to the analysis of the organs into tissues, the analysis of the tissues themselves into cells. The exact date of the invention of the compound microscope is uncertain. It may, however, be stated with sufficient accuracy to have been made about the year 1600. For full two hundred years the microscope continued to be a very imperfect instrument, compared with what it has become during the present century. Nevertheless, during this time many facts were added to our knowledge of minute anatomy; and many observations were recorded which are singularly suggestive, when viewed in the light reflected upon them from

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the results of recent researches. For example, Borellus, of Pisa, in 1656, described pus-corpuscles as animalcules, and even asserted that he had seen them delivering their eggs! Can it be doubted, that despite the feeble powers of his glasses, there had been revealed to his earnest inquisition the same phenomena of the rapid movement and the rapid multiplication of these organisms that Dr. Beale has so graphically demonstrated by means of his one-fiftieth of an inch objective and his carmine fluid?

In 1658, Swammerdam recognized the blood-corpuscles. In 1667, Robert Hooke pointed out the cellular structure of plants. In 1670, Malpighi elaborated this subject still further. He asserted that the cells or vesicles, which he called utricles, were separable from one another, that each had its own proper boundary, and was in fact an independent entity. In 1687, Leeuwenhœk described with considerable accuracy, the blood corpuscles not only of man, but of the lower animals. He it was also who made the discovery of the spermatozoids, which he believed to be animals of different sexes; and who first announced the globular structure of the primitive tissues of the body. This globular theory was still further elucidated by Milne Edwards, Baumgartner and others, about the year 1825, and paved the way for the cell-theory of Schleiden and Schwann, which was given to the world in 1838 and 1839.

Already both the vegetable cell and the animal cell, as isolated structures, were sufficiently well known, and their importance as factors of organization had also been in some degree recognized. Schleiden was a botanist, and his reseaches are confined to the cellular anatomy and physiology of plants. Schwann applied the same doctrine to the explanation of the anatomy and physiology of animals, and proclaimed the neucleated cell as the "fundamental expression of organic forms;" that is to say, that all the tissues of all animals and plants are built up out of neucleated cells.

On account of its intrinsic interest, as well as on account of its great importance in the history of biological speculation, I add here Schwann's own statement of the theory of the spon-

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taneous generation of cells, which is maintained by himself and by Schleiden. I quote from the Sydenham edition of his Researches:

In a cytoblastema either structureless or minutely granulous, "a nucleolus is first formed. Around this a stratum of substance is deposited, usually minutely granulous, but not yet sharply defined on the outside. As new molecules are constantly being deposited in this stratum between those already present, and as this takes place within a precise distance of the nucleolus only, the stratum becomes defined externally, and a cell-nucleus having a more or less sharp contour, is formed. The nucleus grows by a continuous deposition of new molecules between those already existing, that is by intussusception. If this goes on equally throughout the entire thickness of the stratum, the nucleus may remain solid; but if it goes on more vigorously in the external part, the latter will become more dense, and may be hardened into a membrane, and such are the hollow nuclei." When the nucleus has reached a certain stage of development, the cell is formed around it. "A stratum of substance, *which differs from the cytoblastema*, is deposited upon the exterior of the nucleus. In the first instance, this stratum is not sharply defined externally, but becomes so in consequence of the progressive deposition of new molecules. The stratum is more or less thick, sometimes homogeneous, sometimes granulous; the latter is most frequently the case in the thick strata which occur in the formation of the majority of animal cells. We cannot at this period distinguish a cell-cavity and a cell-wall. The deposition of new molecules between those already existing proceeds, however, and is so effected that when the stratum is thin, the entire layer, and when it is thick, only the external portion becomes consolidated into a membrane. Immediately that the cell-membrane has become consolidated, its expansion proceeds as the result of the progressive reception of new molecules between the existing ones, that is to say, by virtue of a growth by intussusception, while at the same time it becomes separated from the cell-nucleus. The interspace

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between the cell-membrane and the cell-nucleus is at the same time filled with fluid, and this constitutes the *cell-contents*. During this expansion the nucleus remains attached to a spot on the internal surface of the cell-membrane."

The publication of the researches of Schleiden and Schwann marks an era in the progress of physiology. In the words of Mr. Huxley, "whatever cavillers may say, it is certain that histology before 1838, and histology since then, are two different sciences—in scope, in purpose, and in dignity,—and the eminent men to whom we allude, may safely answer all detraction by a proud 'circumspice.'" Nevertheless, there is hardly a single point of their description of the genesis and structure of cells which has not been either altogether overthrown or else largely modified by the results of later investigations.

Already, in 1854, Pringsheim had called in question the necessity of the cell-wall to the constitution of a perfect cell; and Leydig, in 1856, followed by Max Schultze in 1861, defined the cell as a *mass of protoplasm inclosing a nucleus*, the cell-wall being nothing more than the hardened periphery of the substance of the cell. Bruke, also in 1861, went still further, and denied that the nucleus was an essential element of the cell, adducing in support of his opinion the non-nucleated cells of cryptogams. Shultze had discovered a non-nucleated amœba in the Adriatic in 1854; and in 1865 a non-nucleated protozoon was discovered by Hæckel in the Mediterranean, and two non-nucleated monads by Cienkowsky. Altogether, therefore, the proof is overwhelming, that cells capable of life, motion, growth and reproduction may exist without a nucleus as well as without a cell wall; and the universal conception of the simple cell as the unit of organization is now that it is an individualized particle of protoplasm, entirely homogeneous, without a nucleus, without an investing membrance, and without any recognizable structure whatever. The cells which exhibit the nucleus and the cell-wall, one or both,—and they are very numerous indeed,—are not primitive and simple cells, but cells that have already passed through a process of differ-

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entiation and development. It is only to these higher cells that the anatomical details of Schleiden and Schwann are still in some measure applicable; and at wide variance with the doctrines under examination, it is now held with reference to these higher cells, that their investing wall is caused by the consolidation of their most external portion, while the nucleus is due to a new growth of younger protoplasm within the original mass.

But no other part of this theory has been so vigorously assailed as the doctrine that cells arise spontaneously, and without the intervention of parent cells, in a structureless blastema. Already of great interest as a problem in special physiology, it has become invested with still greater importance since it has been clearly appreciated that it is really only a special phase of the great question of the commencement of life and the development of living things.

Among those who have made themselves memorable on account of the ability with which they have opposed the doctrine of spontaneous origin, or of archebiosis, to borrow Bastian's technical designation, I shall mention only two—Virchow and Beale.

In Virchow's great work on Cellular Pathology, which was published in 1858, he maintains: that the cell is the true biological unit; and that every cell is derived from a pre-existing cell, all the cells of any individual organism being the lineal descendants of the original germ-cell of the ovum; so that with him the maxim of Harvey, *omne vivum ex ovo*, becomes in its special application to histology, *omnis cellula e cellula*. Another of his fundamental doctrines is that by far the larger portion of the organism is made up out of cells derived by proliferation and differentiation from the corpuscles of the connective tissue. Still another is his doctrine of cell-territories, which I can do no more than allude to here—a doctrine which he borrowed from Goodsir.

It was in 1861 that Dr. Beale gave to the world the first definite statement of his doctrine of cells and cell-metamorphosis. He is one of the ablest of the expounders of the

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protoplasmic theory, and has presented some important contributions to it, which are now very generally accepted. In the nomenclature of the theory, also, he has made some innovations. The living matter he prefers to call bioplasm, and he designates the cell as a bioplast.

He holds with the school of Virchow, that living matter, and living matter only, can generate living matter; and that, therefore, every cell must originate in the proliferation of some pre-existing cell. He holds further, that all cells, or bioplasts are in the beginning simply extremely minute, solid, homogeneous, and individualized masses of living matter or bioplasm; and that all bioplasts grow, not by the superposition of additional bioplasm upon their external surfaces, but by the genesis and integration of bioplasm in their central parts; so that in every bioplast the central parts are always the youngest and most vigorous; while the peripheral parts, being older and feebler, grow continually less and less active in the discharge of vital functions, and at last cease in any proper sense of the word, to live at all.

But it must not be hastily concluded that this dead matter, or *formed material* of the tissues, has become excrementitial and useless to the organism. Far from it, indeed. For it is out of this material which has ceased to grow, and which has lost the power of transforming the elements of nutrition into living bioplasm, that all the wheels and levers and pulleys,—all the complicated scaffolding and machinery of the organism, are constructed.

DIGRESSION ON THE AMŒBA.

Many of the vital characteristics of cells or bioplasts, and many of the fundamental phenomena of living matter may be studied to much advantage as they present themselves in amœbæ. Under this general name of amœba have been classified some of the simplest of living creatures. They have usually been regarded as denizens of the animal kingdom; but have been transferred by Hæckel into his new kingdom of the protistæ,—a kingdom which has been erected

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to include all those living creatures which have not undergone a sufficient amount of differentiation of parts to display the essential characters of either animals or plants. There are many tribes and families of these creatures; and amongst them the amœba is one of the lowest. Yet these creatures also, so great is the variety of nature, present themselves under many different forms.

In their simpler forms they exhibit no structural differentiation whatever, not even a contained nucleus nor an investing membrane, but are homogeneous throughout. They can hardly be called organisms, because they are entirely destitute of organs. In brief, they are extremely minute masses of protoplasm,—little microscopic lumps of living jelly. Still they manifest all the essential phenomena of life. They move; they eat; they grow; they reproduce their kind. They are sprawling things, without any definite or abiding shape, and go crawling about, in no particular direction, and with no obvious purpose. They thrust out any portion of their jelly like bodies into an improvised arm or foot; and this may be immediately retracted, and another thrust out in some other direction, or its extremity may become fixed and drag the whole body after it. If they come in contact with a particle of food, mouth and stomach are improvised for its appropriation, the soft body of the creature opens to receive it, and flows slowly around it so as to inclose it completely; and when all the nutritive material has been extracted from it, opens again, and the indigestible debris is rejected through an improvised vent which immediately disappears. If one of them is separated into any number of fragments, each fragment becomes a complete amœba,—lives and grows, and pursues an entirely independent career. Like Milton's angels, they are vital in every part, and cannot but by annihilating die. *Per contra*, if two or more of them come together they immediately fuse into one, and neither joint nor seam remains to mark the place of union. A large number thus fused together into a considerable mass constitutes what is called a plasmodium. After leading an active

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predatory life, for a longer or shorter time, their activity ceases and they become torpid. Under the influence of the same physical laws which mould the rain-drop, their sprawling, shapeless bodies become globular, and the external protoplasmic layer of the globe hardens into an investing membrane. Then the soft homogeneous protoplasm inside of the investing membrane undergoes a process of segmentation exactly analogous with the segmentation of the mammalian ovum during the initial stages of fœtal development. But the subsequent history of the segments is different. In the mammalian ovum all the segments concur towards the formation of a single complex organism; while every separate segment of the encysted amœba develops into an individual living creature. The segments, appearing at first in the form of simple cells, gradually assume the form of monads, and, rupturing the investing membrane, swarm out into the circumjacent water, where they soon lose their definite outlines, and pass into the sprawling amœboid type of their ancestors.

There is good reason to believe that the amœba may arise in still another way,—that it may arise spontaneously in fluids holding organic matter in solution. Take, for example, a perfectly transparent and homogeneous infusion of hay. Expose it to the heat and light of the sun, and in a few days it becomes milky and opake. The explanation of this change is that the organic matter of the solution has gathered itself into fine granular masses,—masses too small for separate examination, many of them less than the 100,000th of an inch in diameter. These granules gradually increase in size, and rise to the surface of the infusion in the shape of a granular pellicle,—the proligerous pellicle of Pouchet,—the primordial mucus of Burdach. Under the microscope irregularly shaped portions of this pellicle are soon found to undergo a process of differentiation, and these portions are then called embryonal areas. Within these areas the granules aggregate themselves into groups, which are at first of irregular outline, then become globular, and then encysted, and are ultimately developed into living amœbæ. What I have said applies chiefly to

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the lower amœbæ, such as the amœba porrecta, of Max Schultze; the *protamœba primitiva*, of Hæckel; and the *protomyxa* aurantiaca, of the same author.

In the higher amœbæ, such as the *amœba nuclearia*, and the *amœba limax*, there are some rudimentary evidences of structure,—namely, a nucleus, an investing membrane, and some approximation to definite shape. It seems to be well established that the lower forms of amœbæ some times undergo differential development into the higher forms of amœbæ, as, also, into the closely allied forms of *gregarina* and *actinophrys*. But into this tempting field of the transmutation of species I must not allow myself to enter. I hope that I have said enough to indicate the true character, and the biological relations of these creatures,—enough at least to show that there is ample warrant for the statement which I made a little while ago to the effect that the white blood-corpuscle is an amœba. They are composed of the same protoplasmic matter aggregated into the same elementary forms. The simple amœba is a simple cell like the white blood-corpuscle during the most active period of its existence. The nucleated and encysted amœba is a neucleated and encysted cell, such as the white blood-corpuscle becomes towards the close of its busy life. Under the microscope some forms of the amœba and some forms of the white blood-corpuscle resemble each other so nearly as to be absolutely indistinguishable.

THE ORIGIN OF THE WHITE CORPUSCLE.

Having given, as I hope, something like an adequate conception of what the white blood-corpuscle is, the next problem that presents itself for consideration is, the problem of its origin. Here it is better to widen the scope of the inquiry; and this because in discussing the origin of the white blood-corpuscle it becomes necessary to consider also the origin of certain other white corpuscles of a similar nature, namely, the lymph-corpuscle and the pus-corpuscle. Since the fact has been recognized by physiologists, that these several kinds of corpuscles are indistinguishable from one another by any

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analysis we are able to make, the want has been felt of a designation alike applicable to them all. For this purpose the most convenient name is that suggested by Robin, who calls them all leucocytes. The word bioplast, introduced by Dr. Beale, is of still wider application, comprehending all living cells whatsoever.

There are several different hypotheses with reference to the origin of leucocytes.

1. Those who endorse the doctrine of Virchow, that cells are always the offspring of other cells, hold that the leucocytes which inhabit the blood are the products of the proliferation of other leucocytes—of other white blood-corpuscles or of lymph-corpuscles.

2. It was also held by Virchow and his school, that the leucocytes which constitute the characteristic corpuscles of pus result from the proliferation of the corpuscles of the connective tissue.

3. Dr. Beale and his followers teach that pus-leucocytes are also developed by the abnormal growth and proliferation of the bioplasm of epithelial cells, such as are found covering the external integument of the body, and lining the mucous membranes of the alimentary and respiratory passages.

4. In harmony with the doctrines of Schleiden and Schwann, in relation to exogenous cell formation, it has been a very common opinion among physiologists, that the several varieties of leucocytes arise spontaneously in the vital fluids by the coalescence of albuminous molecules. In this way the lymph-corpuscles are believed to originate from fluid protoplasm in the lymphatic vessels and glands. In this way also it has been believed, by at least a few authorities, Dr. Bastian among the number, that white blood-corpuscles are formed within the blood vessels themselves, from the albuminous materials of the serum of the blood. In this way it has been believed that pus-corpuscles are developed in inflammatory effusions. And Robin has recently described with much circumstantiality, the formation of leucocytes, which become ac-

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tive agents in the process of reparation, in the organizable lymph which covers the surface of wounds.

5. It is a favorite speculation of many physiologists, that leucocytes are formed exclusively in the glands and follicles of the lymphatic system; and that cell-formation is the special function of these organs. Of the fact of the abundant formation of leucocytes in the lymphatic glands, there can be no question; because it has been shown that the lymph which passes from them is much richer in cells than that which they receive through their afferent vessels.

But whether the process of cell-formation within the lymphatic glands is by the proliferation of existing cells, or by the direct morphological transformation of the elements of the lymph, is entirely unknown. And while we may freely admit that these glands are important agents in the generation of cells in the higher animals, we have no warrant for the conclusion that this is the only method of cell-genesis; and this for the reason that leucocytes are even more abundant in those lower orders of animals in which no lymphatic glands have been found, as, for example, in the amphibiæ.

It has been asserted, first I believe by His, and subsequently by several other observers, that in a very early stage of fœtal development, before the vascular circulation has been established, leucocytes are formed from the protoplasm lining the walls of the developing vessels; and Dr. Beale has suggested that a similar process of cell-genesis continues to occur during adult life.

6. In the midst of this multitude of opinions it is easy to see that the really important issue always remains the same, namely, this: Whether the genesis of leucocytes is entirely dependent on the process of proliferation; or whether it may also be accomplished by direct development out of amorphous blastemata. The process by endogenous division or proliferation, is very generally admitted. But it must be remembered that the admission rests upon purely analogical grounds, and not upon the evidence of direct observation. The proliferation has never been seen to take place. The

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process by direct exogenous development, on the other hand, has met with considerable opposition, especially within the last few years, since it has been appreciated that in this controversy is involved all the principles of that larger controversy as to the spontaneous origination of living things. For myself, I have learned that nature is in the habit of using many and complex methods and agencies for the accomplishment of her purposes; and I do not hesitate to avow my belief that leucocytes may originate by any and all of the methods which have been indicated; and very specially I do not hesitate to endorse the method of formation which excludes the agency of cellular parentage.

This theory, indeed, stands upon quite as secure a foundation of facts and analysis as any other. It finds apt illustration, for example, in the account which I have given of the origin of amœbæ in the embryonal areas of the proligerous pellicle of organic infusions; and it would be easy to multiply illustrations of similar character. Take the following from the vegetable kingdom: There are several species of Algæ, such as Chara, Nitella, and Spirogyra, which consist of cyllindrical filaments, with transparent walls, inclosing liquid protoplasm. Now, under the microscope, this protoplasm may be seen to become granular; the granules may be seen to aggregate into spherical masses; and these spherical masses may be seen to become encysted, by the condensation of the outer layer of the protoplasm, thus constituting fully developed cells. If we follow the subsequent history of these cells, thus spontaneously developed in the internodes of Chara, we might find them giving issue to monads, or to amæbæ, or even to creatures of far higher type than these; thus repeating the strange drama of archebiosis already enacted in the proligerous pellicle.

THE MOVEMENT OF LEUCOCYTES.

The movements of leucocytes, as are those of all amœbaform creatures, are of two sorts; first, those resulting simply in change of shape; and secondly, those resulting also in change of place.

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As long ago as 1835 the amœboid protrusion of portions of its soft protoplasmic body by the blood-leucocyte, was observed by Wharton Jones; and similar movements were soon afterwards noted by Davaine and several other observers.

The passage of the blood-leucocytes from the blood-current through the walls of the blood-vessels was affirmed by Dr. Addison in 1841. The same fact was again described, with much minuteness of detail, in 1846, by Dr. Augustus Waller. And both of these observers declared that the extruded white blood-corpuscles were in all respects identical with the corpuscles found in pus.

They failed, however, to grasp the conception that the leucocytes were endowed with independent amœboid vitality and the faculty of spontaneous locomotion. They were consequently unable to give a rational explanation of the phenomena of which they were the first witnesses. They stood upon the threshold of the discovery which has revolutionized both physiology and pathology; but with the doors of the temple of life wide open before them, they saw nothing but shadows. Their observations bore no fruit, and very soon fell into oblivion.

I have shown how one revolution in histology followed the application of the compound microscope to physiological research. The new revolution of which I am now speaking followed also upon the introduction of improved methods of investigation. Of these by far the most important is the substitution which has been so largely made of the living tissues and fluids in the place of their dead remains as the objects of physiological and pathological study. The living elements of the tissues, and especially those in which the vital functions are most active undergo great changes in the very act of dying, and are still further altered by immersion in water and acetic acid and other fluids, and by the various manipulations that have been employed as the preliminaries of microscopic examination; so that it is easy to see that if we would know organic forms in their organic integrity we must study them while they are still living.

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The importance of making the living tissues themselves, under the various conditions and circumstances of real life, the basis of histological study was never indeed entirely overlooked, nor greatly underrated. But the difficulties attending this sort of study were almost insuperable, until within quite recent times they have been in some measure overcome by the employment of curare and chloroform. The first of these agents enables us to paralyze the nerves of voluntary motion; the second enables us to paralyze the nerves of sensation; while both of them leave untouched all the great functions of organic life, such for example, as respiration, circulation and nutrition. In this way by abolishing at the same time the power of motion and the sense of pain in the creatures subjected to examination, some of the cardinal obstacles which stood in the way of histological discovery have been removed, and many things have been seen face to face which before were visible only as through a glass darkly.

The complete and final demonstration of the amœboid endowments of leucocytes was made by Professor Von Recklinghausen, and was published by him in a paper on suppuration which appeared in 1863. In this memoir Von Recklinghausen established on a firm basis the following propositions:

1. That leucocytes exhibit rapid amœboid changes of form.
2. That leucocytes possess the power of moving from place to place through the meshes of the soft tissues.
3. That leucocytes are capable of flowing around minute solid particles of any kind so as to imprison them completely or partially in the soft protoplasm of their amœboid bodies.

The amœboid changes of form were established by observations made on pus-corpuscles which were found in the aqueous humor of the anterior chamber of the eye of a frog a few days after keratitis had been excited by irritation of the cornea. I add here the account of what he saw in his own words:

"The corpuscles differ very strikingly in their form from those from which the ordinary descriptions are taken. * * *

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No globular forms present themselves,—only jagged ones, and the prongs vary both in length and number. But what strikes one even after very brief examination is, that each corpuscle is constantly changing its shape. While one prong withdraws itself into the body of the corpuscle, another juts out. Each prong is at first a delicate, homogeneous, somewhat slimy thread; but it soon thickens at the base, lengthening at the same time. Then gradually the substance of the corpuscle tends more and more towards it, becoming smaller as the process gets larger, the whole thus assuming an oblong or protracted form. During this transformation the tip of the process is rounded off and subsides into the contour of the corpuscle; or new thread-like processes shoot out and again undergo the same changes."

The ingestive power of the leucocytes was proved by a variety of experiments. One method was by the introduction of milk into the lymph-cavities of frogs, the result being that the corpuscles of the lymph or white blood of these creatures became choked with milk-globules. Another method was the injection of finely divided vermilion into these cavities. The vermilion was speedily absorbed by the leucocytes with the effect of course of imparting to them a red color. This method of feeding the leucocytes with insoluble pigments injected into the circulating fluid affords a ready means of marking the blood-leucocytes, so that they may be distinguished from those which are indigenous to the tissues.

The proof of the faculty of locomotion in the leucocytes was derived from such experiments as these:

The lymph-cavity of a frog was injected with vermilion so as to color the leucocytes. The cornea of a rabbit, or of a dog, was then introduced into it, and allowed to remain for two or three days. The lymph-sac of course became inflamed, and the fragment of cornea was found to have grown turbid in its superficial portions, the central parts still retaining their natural transparency. Microscopic examination showed that the turbidity was due to the presence of amœboid leucocytes in the dead tissue; and that these leucocytes were derived by

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immigration from the purulent lymph in which the cornea had been immersed was evident from the fact, that they were living and moving, that they contained particles of vermilion, and that they agreed in size and other characters with the leucocytes of the frog.

In this little historical sketch it is important to remember that Von Recklinghausen's researches were confined to the leucocytes of pus. His experiments were repeated and varied by many observers, with the result that abundant confirmation was brought to sustain his conclusions.

For example, Lortel, of Lyons, found that if any porous substance is introduced into a suppurating cavity, the leucocytes penetrate into it in the same way as they do into the dead cornea; and that if the swimming bladder of a small fish, filled with water, is introduced into an abscess, the enclosed fluid soon becomes peopled with leucocytes.

The next important step in this investigation was made by Cohnheim, who in 1867 announced the migration of blood-leucocytes, during the earlier stages of inflammation, through the walls of the bloodvessels into the adjacent tissues. I proceed to give some account of the experiment by which this immigration was demonstrated.

A male frog, which has been paralyzed by the injection under the skin, of about the one-2000th of a grain of curare, is secured on a plate of glass. A vertical incision is then made through the abdominal wall, extending from the lower edge of the liver downwards to the extent of half an inch; and so much of the small intestine is drawn out of the visceral cavity as is necessary, in order that the mesentery may be evenly spread on a disc of glass, which is fixed in a convenient position for the purpose. After an interval of some hours the exposed peritoneum begins to inflame. First there is increased activity of the capillary circulation. Then follows the stage of the retardation or slowing of the blood-current; and simultaneously with this the leucocytes begin to crowd against the vascular walls, until the veins become lined with a continuous pavement of these bodies, which remain almost mo-

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tionless, notwithstanding that the axial current still sweeps along. Now is the time when the migration is likely to commence, and it is necessary to select some particular vessel for observation. Upon the outer contour of this vessel spring out minute, colorless, button-shaped elevations, just as if they were produced by the budding out of the wall of the vessel itself. The buds increase gradually and slowly in size, until each assumes the form of a hemispherical projection of a width corresponding to that of a leucocyte. Eventually the hemisphere is converted into a pear-shaped body, the stalk-end of which is still attached to the surface of the vein. Gradually the little mass of protoplasm removes itself further and further away, and as it does so, begins to shoot out delicate prongs of transparent protoplasm from its surface, in no wise differing in appearance from the slender thread by which it is still moored to the vessel. Finally this thread itself is severed and the process is complete. The observer has before him an emigrant leucocyte in all respects similar to those which have been already described in the aqueous humor of the inflamed eye.

This description of the migration of the white blood-corpuscles through the walls of the bloodvessels, which is given almost in the very words of Cohnheim's account of his observations on the frog's mesentery, is almost identical, even in its details, with that of Waller, twenty years before, of his observations on the frog's tongue. And yet the fame of Cohnheim's discovery has resounded to the ends of the earth, while Waller's never attracted any serious attention and was at once forgotten. The explanation is easy. Waller was ahead of his time. The verification of the fact which he announced was difficult; it could not be put to use; there was no place for it in any of the current schemes of physiological speculation. No wonder then that the discovery fell stillborn. When Cohnheim's investigations were made all the circumstances had been changed. The announcement harmonized with many established opinions, and met with comparatively easy and abundant verification.

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Accepting, then, the amœboid character and the extravascular migrations of the white blood-corpuscles as definitely established, we proceed next to inquire into the nature and extent of their agency in physiological and pathological processes.

As to the migration of the blood-leucocytes, it will be observed that it has been seen to occur only in the initial stages of inflammation, that is to say, as a pathological process. Does it also occur as a physiological process under the ordinary conditions of growth and development? This question must be answered in the affirmative; because there are many facts to warrant the affirmation, and because it is a well established principle that pathology is only abnormal physiology,—that the condition of disease is not a radically different condition from that of health, but simply a prolongation higher or lower of the actions proper to the normal organism.

THE PHYSIOLOGICAL RELATIONS OF THE WHITE BLOOD-CORPUSCLES.

Here again we have reached a station at which it becomes expedient to widen the field of discussion.

We have learned already that blood-leucocytes are individualized particles of living bioplasm; that in very truth they are *quasi* independent living creatures, endowed with all the vital faculties of the simpler amœbæ, including the faculty of spontaneous locomotion; that on account of their frequent community of origin and of destiny, and of their invariable community of character, the study of them cannot be separated from the study of the leucocytes of lymph and of pus.

Let us now learn that they are also of the same identical nature with the germinal vesicle, with the segmentation-spheres of the developing ovum, and with the so-called cells of the blastodemic layers of the embryo, out of which are developed all the tissues and organs of all the higher orders of animal creatures, and it will be seen that I had ample warrant for the assertion that the stone so long rejected of the builders, was become the chief of the corner,—that it was upon the foundation of the white blood-corpuscle that the physiology of the future was to be constructed.

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The problems involved in this division of our subject can be presented to the greatest advantage in a general discussion of the metamorphoses of leucocytes. To this we will accordingly proceed.

THE METAMORPHOSES OF LEUCOCYTES.

At a previous stage of this inquiry, we found it expedient to substitute for the term "white blood-corpuscle," the more compact and comprehensive term, "leucocyte." Now that we have reached a still higher generalization, it becomes again convenient to change our nomenclature. Hereafter, therefore, we will use in place of the word "leucocyte," the more general expression introduced by Dr. Beale, namely, "bioplast." We have, then, to designate the science of living creatures, the term Biology; to designate living matter, the term Bioplasm; and to designate any individualized particle of living matter, the term Bioplast,—a nomenclature which is at once consistent, convenient, comprehensive and suggestive.

We are now ready for the discussion of the metamorphoses of bioplasts,—that is to say, for the discussion of the genesis, the growth and development of living tissues, and of living creatures, for all these questions will be found to be involved in the metamorphoses of white blood-corpuscles, or of their biological equivalents.

By the growth of a living creature we mean that there is an increase in its size, that is to say, in the quantity of living matter which it contains. In analyzing the processes of growth there are three things to be considered, namely:

1. The living creature itself which grows. This may be a creature whose whole body consists of a single microscopic mass of bioplasm—a single bioplast without organs or tissues. Or it may be a creature compounded of many millions of bioplasts or cells arranged into many complex tissues and organs. But in all cases the act of growth is essentially the same. Each individual bioplast, whether living alone or colonized in a complex organism, appropriates for itself, by

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the exercise of its own vital powers, the food upon which it lives and grows.

2. The food or pabulum which is appropriated in the process of growth,—the materials out of which the bioplast constructs the very substance of its own body. The cardinal fact of the process of growth is this, that the act of appropriation of food is an act of transformation. The bioplasm is always of a different nature from the food out of which it was made. The elementary constituents of the food,—the carbon, the hydrogen, the oxygen, the nitrogen, the sulphur, these indeed are not changed; but their molecular arrangement is changed and the amount and character of the change is not always the same. Plants, which contain chlorophyll, are able to transform into biaplasm the inorganic gasses of the atmosphere; while the highest feat of constructive chemistry of which animals, which contain no chlorophyll, are capable, is the transformation into bioplasm of the albuminous colloids. In either case matter which is not living is metamorphosed into matter which lives.

3. The products and sequences of the process of growth. The bioplast which grows increases in size; and this increase of size results from the addition to its mass of new bioplasm. It is important to remember, what has been stated before, that the new bioplasm is not added to the surface of the growing bioplast by superposition; but it is added to the central parts by intussusception; so that the outside parts of the bioplast are always oldest,—are always growing senescent, while the central parts exhibit the plasticity and energy of youth. Again, as the food passes by metamorphosis into bioplasm, so the bioplasm in its turn passes by another metamorphosis into the formed material—the structural elements of the tissues and organs. This formed material which first appears on the periphery of the bioplast does not itself grow, but increases by the superposition on its internal surface of other formed material derived from the metamorphosis of other bioplasm. Last of all, the formed material itself undergoes

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metamorphosis,—disintegrates and passes back into the realm of inorganic nature.

THE MYSTERY OF REPRODUCTION.

The most fundamental metamorphosis then of a bioplast is its metamorphosis into formed material—into histogenetic elements. But this metamorphosis is not universal. There are many bioplasts which pursue an entirely different career,—which undergo metamorphosis by the division of their bodies, and thus become instrumental to the process of genesis, generation, reproduction,—the process by which the multiplication of bioplasts is accomplished.

The whole mystery of reproduction, in all the kingdoms of organic nature is found here in the division of a bioplast,—in the separation of one microscopic mass of living matter into two microscopic masses of living matter, for this is, in very fact, the separation of one living creature into two living creatures. The relations existing between growth and genesis are of the most intimate kind. Indeed, in ultimate analysis they are but two phases of the same vital process. Growth is continuous development. Genesis is discontinuous development.

We have seen that the multiplication of the lower amœbæ is accomplished by two apparently different processes. But a little examination shows that the two processes are really of the same essential character, taking place under the influence of different circumstances, and differing only in nonessential details. Both are processes of segmentation—that is to say, of single division. When the amœba is young, and its entire mass is composed of growing bioplasm without any peripheral envelop of formed material, the segmentation involves the outside as well as the inside of the mass. But when the amœba is older, and has become enveloped in a layer of matter which has ceased to live, then the segmentation is confined to the living bioplasm within the envelop.

Here, in the primitive type of the reproductive process, there is no such relation between successive generations as

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that of parent and offspring. The young amœba has neither father nor mother. One living creature has not produced another living creature, retaining at the same time its own individuality unimpaired; but one individual has passed entire with all its parts and powers, into several segments, each of which is a new individual.

When we get a little higher up in the organic hierarchy, among creatures of larger size and more complex construction, the genesis of new individuals is still accomplished by segmentation; but in these the segmentation is partial instead of general,—that is to say, the division does not destroy the individual identity of the creature which is divided. Here we might in some intelligible sense speak of parent and offspring. But at first, and through primitive types innumerable, the parent is neither father nor mother, and the offspring are neither sons nor daughters. As yet there is no sex.

Reproductive segmentation may be either external or internal. In the case of external segmentation a bud grows out from some part of the external membrane which envelops the body of the parent, and in due time is thrown off and left to shift for itself. In most of these cases the segmentation is necessarily external, because most of these creatures have no cavities in their bodies, and consequently no internal membranes which can give origin to internal segments.

But as soon as, in the ascending scale of living things, we arrive at creatures containing cavities in their bodies, it is within these cavities, and upon their lining membranes, that the segmentation occurs.

The change from external segmentation to internal segmentation, is not of so radical a nature as at first it appears to be. The internal membranes are only infolded portions of the external membranes,—are, in other words, only portions of skin which have dipped down into the visceral cavities. These membranes, both internal and external, are covered with epithelium,—with epithelium variously modified and differentiated according to circumstances, that is to say, according to the action of incident forces. And this rule holds good down

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to the smallest glands and follicles which open upon the skin, or upon any of the mucous surfaces. The mucous membranes, being thus mere involutions of the skin, are, in all essential particulars, of the same character with it. But inasmuch as they are softer than the skin, more permeable to the elements of nutrition, and more protected from adverse influences, they present more favorable conditions for the outgrowth of the reproductive buds or segments. It is for this reason that nature, always parsimonious and wisely frugal of her resources, selects these internal membranes as the instruments and agents of reproduction. And this stage of animal development being once reached, internal gemmation, internal segmentation, internal reproduction becomes henceforth the invariable rule.

And this little bud or segment, which is the beginning of a new creature, what is it? and whence is it derived? It is a little mass of bioplasm; and it is developed from one of the epithelial elements. In other words, it is a bioplast resulting from the metamorphosis of an epithelial cell. But what then is an epithelial cell? This also is a bioplast which has undergone a special metamorphosis. And whence this marvelous bioplast, which is the common germ alike of epithelial cells and of living animals? In the present state of physiology, its genealogy cannot be very confidently given. But more and more there is a disposition to accept the doctrine propounded long ago by Dollinger, and more recently by Biesiadecki,—the doctrine, namely, that the epithelial cell is derived by simple metamorphosis from the wandering white blood-corpuscle. And if the epithelial cell is derived in this way from the white blood-corpuscle, why then it is plain that the white blood-corpuscle is the immediate ancestor of every living creature; yea, verily! that man himself, fearfully and wonderfully made, is but an infinitely developed migrating leucocyte.

If it should be objected that Biesiadecki's doctrine of the origin of epithelium is not yet definitely established, this much at least remains certain, namely: That the epithelial cell and

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the migratory leucocyte are of the same essential character,—are both microscopic masses of individualized bioplasm,—are, in a word, biological homologues. In the meantime, the doctrine that every living creature begins in an epithelial cell,—in a bud springing from an epithelial surface, is no longer open to question. And why should this be considered an incredible theory,—an absurd and fanciful physiological dream? It has the support not only of observed facts, but of all the *a priori* presumptions of biological science. The bioplast is the biological unit, the fundamental element of organization. It is therefore the natural and inevitable starting point of every living organ and of every living organism.

It is in the sub-kingdom *Cœlenterata* that permanent cavities first appear, and it is here, consequently, that internal segmentation is first manifested. The permanent cavity of cœlenterate animals is known as the gastro-vascular cavity. Let us understand clearly what is meant by this. In these animals but little progress has been made in the differentiation of organs and functions. They have no vessels for the circulation of the blood; indeed, they have no blood to circulate; but they have a many-chambered, branching cavity which serves at the same time for the ingestion and the digestion of food, and for the distribution of the nutritive fluid. This is the gastro-vascular cavity. It is lined, of course, with epithelium. Now, in the lower *Cœlenterata*, the entire reproductive apparatus consists of a few spots on the surface of the walls of this cavity. These spots are covered with a sort of epithelium, which is known as germ-epithelium, the cells of which, by simple growth, become developed into eggs.

In the higher *Cœlenterata* the process of differentiation has taken another step in advance. The germinal spots sink down into the thickness of the walls of the cavity, so as to form epithelial follicles or sacks. Within these follicles the eggs are developed as before, by the simple growth of the epithelial elements. When mature they are discharged into the gastric cavity, and thence find their way into the external world.

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We have thus traced the process of reproductive gemmation, or segmentation, or ovulation, as far as is necessary for the purpose which we have in view. It is true, that we have only reached the borders of the animal kingdom, the *Cœlenterata* being the first creatures in the ascending scale of development, which are distinctly and unmistakably animals. But the type of ovarian development which they present,—that of one epithelial follicle-gland, is substantially repeated through all the higher classes and orders up to man. There are variations almost innumerable, of special form and location, and of accessory and supplemental organs and appendages; but the type of the epithelial sack is never changed. Away up among the higher orders of *Vertebrata*, the open epithelial sack of *Cœlenterata*, *Annulosa* and *Molluska* is replaced by a closed sack. But as this is still lined with epithelium, and is occasionally opened for the discharge of eggs or germs, it is really only a modification and not a change of the type.

In the human female the ovaries are developed in connection with the *corpora Wolfianæ*. They are the homologues and the analogues of the testes of the male which are also developed in connection with the *corpora Wolfianæ*. In the beginning of their development, they consist of a mass of fibrous stroma, which is well supplied with bloodvessels and covered over with a layer of cylindrical epithelium. This epithelium is also called ovarian epithelium, and germ-epithelium. As the development goes on, some of these epithelial cells are seen to be larger than others, and it is these which are to pass by metamorphosis into the future eggs. Very soon processes of the fibrous stroma shoot up above the general level, while the epithelial membrane sinks down into the depressions between them. The processes continuing to grow, we have presently deep, open follicles lined with the germ-epithelium, such as we have already seen in *Cœlenterata*. Each of these open sacks sinks continually deeper and deeper into the underlying stroma, while the uprising processes approximate more and more until at length they

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touch and adhere together, and the mouth of the sack is closed by their adhesion. This closed sack is the follicle of Von Graafe. Within it the development of the ovum and its envelops gradually proceeds to completion, all of its various parts being derived from epithelial elements.

Inasmuch as we have found the typical ovarium fully developed in creatures like the *Cœlenterata*, which stand at the very beginning of the animal hierarchy, we would expect, in accordance with the principles of transcendental physiology, to find this organ in the higher animals presenting itself at a very early period of fœtal development. And such is really the case. While the fœtus as yet exhibits no signs of human structure, but is still of the soft, larval, and *quasi* cœlenterate type, the ovaries, with the Graafian follicles and the ova are all to be found in a state virtually complete. The female infant comes into the world with her ovaries full of eggs,—that is to say, full of the germs of future human creatures. Nature, usually so parsimonious, makes prodigal preparation for the continuance of the race. The number of ova in the ovaries of a single human female is immense. It has been estimated at as high a rate as four hundred thousand. Of these myriads very few comparatively, perhaps not more than from three hundred to five hundred, ever escape from the follicles in which they were formed; and of those that do escape very few are ever developed into living human beings.

I shall not pause to describe the minute anatomy of the human ovum. The truly essential portion of it is the so-called germinal vesicle. This is a particle of living matter,—a microscopic bioplast, and therefore entirely analogous to the white blood-corpuscle. When mature it contains a nucleus and therefore is a bioplast which has reached a comparatively high stage of development.

As we have already seen the *testes* of the male are both homologous and analogous with the ovaries of the female,—that is to say, their structural relations are the same, and they are appropriated to the discharge of corresponding functions. The spermatazoon is both homologous and analogous with the

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ovum. It is a metamorphosed cell,—the product of the metamorphosis of an epithelial cell, or at any rate of a cell which under other circumstances would have assumed epithelial characters. It is called a seminal cell, and is neucleated like the germinal vesicle. The nucleus forms the head of the fully developed spermatozoon, while the rest of the bioplasm of the cell sprouts out to form the tail; so that the whole substance of the seminal cell is to be found in the spermatozoon. There has been a change of form, and with this the acquisition of new functions. The spermatozoon is therefore very closely related to the white blood-corpuscle.

I cannot enter here into any adequate discussion of the transcendental mystery of sex; but it will not be amiss, perhaps, if I make two or three summary suggestions towards the reduction of the problem to its simplest terms.

What is it that takes place in the act of sexual impregnation? Simply this: Two bioplasts, endowed with different faculties, although closely allied in their physiological history, *are fused into one.* Everywhere the process of sexual conjugation, when stripped of the glamour of mystery and ceremonial with which Nature for wise purposes loves to invest it, has this for its object,—this fusion of two microscopic cells into one.

I said, just now, sexual conjugation! But the conjugation and fusion of cells, as occasional stages in the drama of reproduction, occur very frequently in creatures in which no distinction of sex can be recognized. Take an example or two.

In Desmids and Diatoms, which are unicellular aquatic plants, multiplication usually takes place, by simple duplex subdivision. But occasionally a different plan of reproduction is invoked. Two of these single-celled creatures come together so as to touch one another, it may be by accident, or it may be, as I believe that it is, as the result of some mysterious and reciprocal organic attraction. The walls of the two cells first grow together at the point of contact; and then the partition thus formed is broken down, and the contents

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of the two cells become commingled into a single homogeneous mass of biaplasm. Around this there is soon formed a cellulose envelop, and we have a spore which serves as the starting point of a new series of proliferating cells.

In *Spirogyra*, a genus of fresh water algæ, we find another illustration of cell-conjugation of essentially the same character, but differing a little in some of the details. These plants consist of slender green filaments formed of single rows of cylindrical and elongated cells. Between the cells of two adjacent filaments a wonderful attraction is sometimes seen to manifest itself. In their eagerness to embrace one another the wall of a cell in one filament bulges out to meet a corresponding protrusion of the wall of a cell in another filament; the two protrusions come into contact; the intervening walls are absorbed; the whole of the bioplasmic contents of the two conjugating cells are gathered into one of them; and a spore is thus formed, which in due time germinates into a new plant.

Again. We have seen how several previously independent non-nucleated amœbæ may become associated together in a plasmodium, which in time may become encysted and by segmentation give rise to new generations of amœbæ. Is this, also, an example of reproductive conjugation?

Now here among the lowly creatures which have furnished these examples of conjugation, there is neither male nor female. The conjugating cells are exactly alike. And yet we have here substantially the same physiological results as those that follow the sexual conjugation of the higher plants and animals. We have the mysterious fusion of two cells into one cell,—of two bioplasts into one bioplast, to form the germ out of which a new creature is to be evolved. In other words, we have manifested here among creatures in which no sexual differentiation has been established, that very same process of conjugal reproduction for which the agency of sex is ordinarily invoked as the only possible explanation. It is easy enough to say that this is practically the same thing as the assertion of the real existence of sex in creatures which ex-

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hibit no recognizable sexual characters. And I have no doubt that this is frequently the case. But I believe that in those first and simplest conjugations which occur in the very lowest ranks of organic life, there is no intervention of sex at all,—either of sex actual, or of sex potential; but that the conjugating cells are really, as they seem to be, of the same nature, or, to speak paradoxically, of the same sex,—that is to say, of no sex at all. On this presumption, sex, like all the other faculties of living things, arises by imperceptible gradations out of a common basis of homogeneous bioplasm, in obedience to the general law of organic evolution, through the ordinary processes of growth, development, and differentiation. The diversity, which at length becomes so great, is developed out of a unity which is well nigh absolute.

Let us see, if we can, what it is that really takes place in that wonderful conjugation of bioplasts which is instrumental in reproduction. In the first place, it is evident that conjugation does not belong to the essence of the act of reproduction; and this for the quite sufficient reason that we have found reproduction to take place abundantly without it. Clearly, then, conjugation is not a primitive factor in the process of reproduction. It is only a secondary, an accessory, a supplemental factor.

But what, then, is its special purpose? In what way does it reinforce and supplement the fundamental forces of reproduction? In order that we may find the answers to these questions, we must study the special circumstances under which its agency is invoked. We have seen already that reproduction, in its simplest, in its most primitive, in its truly essential forms, is nothing more than an incident of growth. When growth is continuous we have increase of size,—part is added to part. But growth is sometimes discontinuous; the individuality of the growing mass is destroyed, so that it falls asunder, part from part, and each part becomes a new individual and leads an independent life.

Now this falling asunder of the growing mass,—this curious phenomenon of discontinuous development, occurs during the

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larvel condition of the creature that divides,—that is to say, while the processes of growth are specially vigorous and active. But when the growing mass has reached maturity, and the activities of nutritive life are diminished or suspended, then also, this sort of multiplication is diminished or suspended, and the act of reproduction can be accomplished only through the supplemental agency of conjugation. This supplemental agency of conjugation, then, restores the reproductive or proliferative energy which has been lost through the waning of the powers of growth—of development—of evolution. It always does this. But as we ascend the scale of organic life it is found to do almost infinitely more than this. Its office is magnified more and more the higher we get,—is, indeed, at length so immensely magnified and so variously differentiated, that it is not strange that its original character should be overlooked.

It restores to the senescent and languishing creature, or to some of its segments, its waning power of growth and development. Restores it, but how? The answer to this question even, is not beyond all conjecture. The subsidence of the power of growth and development is concurrent with the establishment of equilibrium among the forces that minister to nutrition. All motion, of whatever character, depends upon some disturbance of equilibrium. In mechanics the complete equilibrium of all the mechanical forces is equivalent to complete rest. In physiology the complete equilibrium of all the vital forces is equivalent to death. Now the fusion of two bioplasts into one in the act of conjugation, breaks up, in the most thorough manner, the paralysis of equilibrium which is stealing over them both, and in the complex mass which results from this union, sets all the wheels of life into active motion.

One of the most curious questions connected with sexual generation, is this: Which is physiologically the real parent of the child, the father or the mother? There can be no hesitation as to the answer. Beyond all question the child is, in a very special sense, the offspring of the mother. Swedenborg tells

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us that the body and animal life of the human child are derived from the mother, but that the soul is furnished by the father. The doctrine of the natural generation of the soul has been condemned by the church; but there is a sense in which this conception of the Sweedish seer becomes exceedingly suggestive. I cannot dwell upon it, however, now.

Sometimes, very frequently, indeed, even among creatures that are truly sexual, the new individual has but one parent; and invariably this solitary parent is of the female sex. Hence this sort of reproduction has been called Parthenogenesis. In the common plant-louse—the *aphis*, for example—when the weather is pleasant and food abundant, a very rapid process of multiplication goes on without any assistance from the male insect. During this time, indeed, the offspring as well as the parents are all females. For generation after generation no males are to be found. But when the conditions of existence become more stringent, when food is hard to get and the weather is unpropitious, and life really becomes a struggle, then the male animal makes his appearance, and the aphide mothers are no longer virgins. We have seen how the ovum makes its appearance in the female fœtus of the human race while the fœtus itself is still within the womb of its mother. The same thing takes place in all the higher animals; perhaps, also, in all the lower animals. At any rate, it has been observed in the organic reproduction of *aphides*, which I have just described. The mother's body incloses the daughter's body, imperfect and immature; and the daughter's body at the same time incloses the still more imperfect and immature body of the grand-daughter; so that we have three generations mysteriously folded up together. It is necessary to add here, that while these rapidly multiplying *aphides* are females, they are not perfect females. The young broods are not developed in a true ovarium, nor from perfect ova; but the process seems to be one of internal gemmation in the simplest sense of the word.

We have, however, examples of parthenogenesis amongst *Hymenoptera* and *Lepidoptera*, in which perfect females, with

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all the generative organs normally developed, prove prolific without any conjugal intercourse with males.

Dzierzon, a Catholic priest in Prussian Silesia, announced in 1845, that the eggs from which the male bees or drones originate are produced and developed by the sole inherent power of the mother bee, without the action of the male seed. In 1863 this doctrine of Dzierzon was fully confirmed by the microscopic investigations of Von Siebold and Lenkhart. The queen bee, as is well known, receives the embraces of the male only during the hymeneal flight. If her wings are crippled so that this flight cannot be taken, she lays eggs which produce only male bees. The workers again, with whom no nuptial rites are possible, sometimes lay eggs, and these always produce drones. It is a curious fact, that in the agamic reproduction of *Aphididæ* the offspring is almost exclusively female; while in the agamic reproduction of *Aphidæ* the offspring consist entirely of males.

A still more curious illustration of agamic reproduction is presented by the *Psychidæ*, a family of butterflies. Here the female is in every way perfect, and endowed with seed-vessel and with copulating pouch. But no copulation is accomplished and no spermatozoa take part in the process of reproduction. The eggs, also, are perfect and with perfect micropyles, but they undergo development without any preliminary fertilization. Amongst these creatures, indeed, reproduction seems to be permanently agamic, without even the occasional occurence of gamogenesis. The search for the male insect has now been continued for many years, but no males have been found. In a word, these wonderful *Psychidæ* are all females and all virgins, with no fierce masculine mates to annoy them with conjugal importunities, and no tempests of sexual passion to disturb the serenity of their lives.

Many other examples of agamogenesis, including also many examples of true parthenogenesis, might be mentioned here. They are so numerous, indeed, that it would hardly be rash to assert that non-sexual reproduction is of quite as common occurrence in the animal kingdom as sexual reproduction; and

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that one-half of the living creatures that are born into the world are born without the instrumentality of male ancestors. But the examples which I have given are sufficient for my purpose,—are sufficient, that is to say, to sustain my assertion that in the process of reproduction sex is not a primitive and fundamental factor, but that it is in reality only a secondary and complemental factor. It is, indeed, in the reproduction of the higher animals an indispensable factor, but it is not primitive and fundamental inasmuch as its agency is not invoked at the beginning of the development of the new creature.

Contrariwise, the development of the new creature amongst the higher animals is always commenced by the mother alone; is always commenced during the mother's fœtal and larval life; and is always in the beginning a process of gemmation or segmentation,—an outgrowth of a portion of the mother's own body. When the development has reached a certain stage of progression,—a stage as high and as complex as can be attained by the unaided action of the maternal forces, and when without some additional energy the development would be arrested and the effort to produce a new creature prove abortive, then it is that the mysterious agency of sex is invoked, and that the masculine energy becomes a factor of the advancing development. New conditions, both static and dynamic, are incorporated into the developing ovum, a more active evolution is established and a higher development becomes possible of accomplishment.

THE DEVELOPMENT OF THE OVUM.

Let us return now to the fertilized human ovum, and mark the stages of evolution through which it passes, until it stands before us a fully developed human creature. The transition is surely astounding,—from a microscopic speck of homogeneous bioplasm to a man fearfully and wonderfully made. The most daring imagination might very well be staggered in the effort to grasp the tremendous conception.

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And yet the agencies at work are of the simplest possible character. They are these four:

1. The enlargement of cells.
2. The segmentation of cells.
3. The arrangement of cells.
4. The differentiation of cells.

In their last analysis enlargement, segmentation, and differentiation, are resolved into modifications of growth; so that the fundamental processes of organization might be reduced to two, namely, the growth of cells, and their arrangement.

If we had commenced with the unfertilized ovum, the first stage would have been that of the conjugation of cells. But this has been sufficiently considered already. We found that the germinal vesicle is a nucleated bioplast; and that the spermatozoon is also a nucleated bioplast. But the fertilized ovum which is the product of their conjugation, is destitute of a nucleus,—is homogeneous and structureless. It finds its way into the uterine cavity, and attaches itself to the *membrana decidua*, by which it becomes invested just as did the original germ-cell in the ovarian stroma. But of these investments we have nothing to say. Our business is with the developing ovum.

The first metamorphosis which this exhibits is the metamorphosis of growth, enlargement, continuous development—the metamorphosis of addition.

The second metamorphosis which it exhibits is the metamorphosis of segmentation, of discontinuous development—the metamorphosis of division. The single mass of bioplasm of the fecundated ovum is separated into many masses of bioplasm. But still, for a time, there is no differentiation among them. As far as we are able to judge, the segments, or segmentation spheres as they are called, are all exactly alike. They are all composed of unmixed bioplasm, of germinal matter, and as yet there is no formed material—no signs of structure to be seen.

Let it be understood without further mention that the two metamorphic processes already described, the process of

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growth, and the process of segmentation, continue indefinitely, and we will turn our attention to the next stage of the evolution.

This next stage, the third, is a process of simple arrangement. It is metamorphic of the whole mass of the ovum, not of its separate segments. The segmentation-spheres march like soldiers to their appropriate places, and arrange themselves into three ranks—the three germinal plates, or blastodermic layers of the embryo. The first of these layers, the external layer, is called by Remak the sensational layer; the second or middle layer, the motorial layer; the third or internal layer, the intestinal or glandular layer. The process of arrangement does not stop with the formation of these primitive blastodermic layers; but other arrangements arise successively within the layers, secondary, tertiary, etc.—arrangements of continually increasing speciality and complexity, and out of these are developed the various tissues and organs of the completed organism. How these arrangements are accomplished, whether as the result of spontaneous impulse and the faculty of amæboid motion on the part of the bioplasts concerned; whether under the influence of external incident forces; or whether through the concurrent action of both of these classes of causes, we will not stop to inquire. The indications of the antecedent causes are vague and shadowy; but the fact itself, of arrangement, is clear and demonstrable.

This brings us to the fourth and last of the metamorphic processes which are concerned in the development of the fœtus, namely, the metamorphosis of differentiation. The arrangement of the bioplasts into rudimentary organs is already in a certain sense, a process of differentiation; it is differentiation of the mass of the developing ovum. But the differentiation now to be discussed, is the differentiation of the separate and individual bioplasts constituting that mass.

Biological analysis shows that the organism is composed of organs, these organs of tissues, and these tissues of histological elements. Now it is to be specially noted here, that every separate histological element—every muscle-fiber, every nerve-

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fiber, every epithelial cell, every constituent structural element of bone, of cartilage, of connective tissue, and of all the tissues, is the product of the differential metamorphosis of a separate and individual bioplast. And inasmuch as in a fully developed human organism there are many millions of structural anatomical elements, so, for the formation of these, many millions of living bioplasts must have suffered metamorphosis and differentiation.

The natural history of every histological element involves these three problems:

1. The derivation of the germinal bioplast, out of which it is developed.

2. The character of the transformation to which it is subjected.

3. The cause of the special transformation, which is in each case accomplished.

In the earlier stages of fœtal development, the germinal bioplasts which pass by differential metamorphosis into the elements of tissues, are the segmentation-spheres of the ovum. In the later stages of fœtal development, and during all the varying periods of life subsequent to birth, the original store of segmentation-spheres having been exhausted, the germinal bioplasts must be derived from some other source. But from what other source *can* they be derived? There is but one possible answer. They are derived from the blood in the shape of white blood-corpuscles.

I have already indicated, again and again, that the segmentation-spheres and the white blood-corpuscles are of the same nature,—are homologues and analogues of one another. But is there any genetic connection between them? Most assuredly there is. The white blood-corpuscles are the lineal descendants of the original undifferentiated segments of the ovum, the inheritors of their features, their faculties and their functions. The process of segmentation, commenced in the microscopic ovum, continues through the entire period of fœtal evolution, continues also through all the stages of infant and adult life, never ceases, indeed, until the organism which it has built up ceases to live.

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Nature never abandons a process which she has once adopted. She may, indeed, under the influence of changing circumstances, modify it in many ingenious ways, and even to such an extent that its identity is difficult of recognition. She may also supplement it with secondary and auxiliary processes; and these, in the progress of development, may gradually increase in importance until the original process is overshadowed by them. Nevertheless it is true, that Nature never changes her mind, and never repudiates anything that she has once indorsed.

While, then, it may be true that white blood-corpuscles arise by other methods than by segmentation of pre-existing bioplasts, as has been suggested in the section of this paper which treats of the origin of leucocytes, it is still not to be doubted that many of them may claim hereditary descent, through perhaps a thousand intervening generations, from the aboriginal unique cell of the impregnated ovum.

DEVELOPMENT OF THE BLOOD-CORPUSCLES IN THE FŒTUS.

Very early in the history of the fœtus, bloodvessels begin to be developed; and at the same time the primary corpuscles of the blood make their appearance. It seems to be a general rule that this development commences in that part of the organism where the heart is ultimately to be found.

In certain definite spaces some of the bioplasmic masses,—the segmentation-spheres become fluid or semi-fluid; and the bioplasts enveloping these spaces are condensed into definite walls, the coats of the future vessels. In the meantime other segmentation-spheres inside of these walled spaces retain their cellular individuality. These are the primitive white corpuscles. Other white corpuscles proceed from these by proliferation. Others still, bud out from the soft bioplasm lining the vessels, from which they gradually separate and drop into the vascular cavities. As yet, however, there is no circulation. The vessels do not form a continuous system. But other vessels are formed, communications are opened

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up between them, at length a general anastomosis is established, and the circulation begins. Hence, as we have said, the white blood-corpuscles are the lineal descendants of the segmentation-spheres of the ovum, and endowed with the same essential characters and functions,—their permanent representatives through all the subsequent stages of the life of the organism.

The passage of the segmentation-spheres into the white blood-corpuscle can hardly be called a metamorphosis or a differentiation. The change which occurs is rather in the surroundings of the segmentation-corpuscles, than in the corpuscles themselves.

But all the other morphological elements of the organism are the products of differential metamorphosis,—are derived from segmentation-spheres, or from white blood-corpuscles, by the transformation already explained of some portion of their bioplasm into some of the varieties of formed material.

The first of these morphological products of differentiation to be mentioned is the red blood-corpuscle. It was for a long time the prevalent opinion among physiologists, that in the gradual ascent by progressive metamorphosis of the elements of the food into the substance of the tissues, the white corpuscle was first formed, that this passed into the red corpuscle, and that the red corpuscle then passing through a still higher transformation became incorporated into the substance of the tissues, and specially of the higher tissues, as the muscles and nerves. But for several years this doctrine has been falling into disrepute; and in several recent works on physiology the supposed histogenetic functions of the red corpuscle, and its derivation from the white corpuscle are both denied.

After the red corpuscle has finished its career of vital activity, it may be that the materials of which it is composed, passing by liquefaction and disintegration into the blood-plasma, are then appropriated by parsimonious Nature, unwilling that anything should be wasted, to the nutrition of the blood and of the tissues. But it is certain that it cannot subserve any purpose of nutrition while it maintains its organic integrity. It is also certain that its primary and special

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function is not nutritive, but respiratory. As to its derivation it is certain, that in the fœtus it first appears as the offspring of the proliferating segmentation-spheres; and upon analogical grounds it would be reasonable to conclude that in later life it springs from the white blood-corpuscles which have succeeded to the functions of the segmentation-spheres. That this presumption is also warranted by facts, seems to be no longer doubtful since the observations of Von Recklinghausen and Golubew on the blood of the frog, in which they were able to detect the intermediate and transitional forms which bridge over the interval between the two types.

As the next example of differential metamorphosis let us see how a blood-bioplast passes into an epithelial cell. The transformation is sufficiently simple. The peripheral layers of the bioplast cease to grow, harden, and are gradually changed from living bioplasm into formed material,—from matter that is homogeneous to matter that exhibits structure. This process of transformation extends deeper and deeper into the bioplasm until we have a central nucleus of living bioplasm enveloped in a shell of formed material; and this is the type of the epithelial cell. A sufficient number of these agglutinated into a sheet-like expansion makes an epithelial membrane. The varieties of epithelium, as pavement-epithelium and columnar-epithelium, depend on the pressure and other incident influences to which the individual cells are subjected.

The muscle-fiber is formed essentially in the same way, by the metamorphosis of a bioplast. The structural material which results is of a different character, and assumes an elongated, spindle-shaped form. It has been suggested that during its formation the bioplast which is undergoing differentiation, moves forward leaving a string of formed material along the path it has travelled.

Cartilage is formed by a strictly analogous method; the only difference worthy of note being that fusion of the separate cells occurs in an earlier stage of the metamorphosis, and is so complete, forming a sort of plasmodium, that their special boundaries are entirely obscured. But each little mass of

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bioplasm still marks the central part of a constituent cell, and the so-called intercellular substance is formed material as before.

After the same general fashion are formed all the structural elements of the body, but it is not necessary to our purpose to pursue this part of the subject further.

In the development of every tissue there are two processes which must be carefully discriminated from one another, namely, the process by which the morphological elements of the tissue increase in size, and the process by which they increase in number. How the individual structural element increases in magnitude is easily understood,—how, for example, a muscle-fiber grows. But by what process is it that the number of fibers in a muscle is augmented, that a new muscle-fiber is added to those already in existence? This is a question not so readily answered. Does some growing muscle-fiber subdivide into two? Or is some new germ introduced from without which developes into a new muscle-fiber? The more we consider the problem, the more it is seen to be evident that if the division of a muscle-fiber is possible at all, it is only possible during its inchoate and, so to speak, larval condition. The fully developed muscle-fiber could be divided only by a process of considerable violence. And if the living bioplasm within the fiber were to undergo division the separated segments would remain imprisoned so that development would not be possible unless the enclosing walls were torn assunder to allow them exit. It is not easy to believe, then, that muscle-fibers originate in the proliferation of muscle fibers. And, inasmuch as the same reasoning is applicable to all the other structural elements of the tissues, it would seem to follow as a necessary generalization, that structural elements such as muscle-fibers, nerve-fibers, epithelial cells, and the like, are never derived directly from pre-existing structural elements of the same kind; but rather that each must spring from a germinal bioplast, introduced from without, through the process of differential metamorphosis. We know that this is the rule in the earlier stages of fœtal devel-

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opment; and we have no proof that a different plan is adopted in infancy, or in youth, or in adult age.

This is not altogether a new doctrine. Dollinger announced, in 1828, that all the tissues were built out of blood-corpuscles, which had penetrated the walls of the bloodvessels and found their way into the interspaces of the tissue-elements. I have not seen Dollinger's book, and know nothing of the details of his scheme. Whatever these may have been, it seems to have exerted little or no influence on the development of physiology, and was very soon forgotten. The difficulties that must have opposed its reception at that time, have been dissipated by the discovery of the amœboid character, and migratory habits of the white blood-corpuscles.

It has, indeed, been recognized for a long time that such highly organized tissue-elements as muscle-fibers and nerve-fibers, for example, do not themselves undergo physiological proliferation. Of late years the prevalent opinion as to histogenesis has been that of Virchow, namely, that all the other tissues are derived from the connective tissue,—that the germs of the structural elements of all the tissues, normal and abnormal, except perhaps the epithelial, are furnished by the connective tissue-corpuscles. But the connective tissue-corpuscles of Virchow are simply masses of living bioplasm which have not yet undergone differentiation into formed material, but which are themselves everywhere surrounded by the formed material constituting this tissue, so that even if the proliferation of these corpuscles really occurred the liberation of the segments would be attended with some difficulty. This difficulty surmounted, however, these liberated segments would be of the same character as the white blood-corpuscles, and in the last analysis the two theories would amount to very much the same thing.

This problem as to whether the bioplasm of the structural elements of the tissues undergoes proliferation, is one of very great importance both in physiology and in pathology, and must be examined a little more thoroughly. We have seen that, in some examples at least of inflammation, the first generation of

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pus-bioplasts are emigrants from the blood. But how about the subsequent generations of pus-bioplasts which present themselves during the subsequent stages of the inflammation? Are these also derived from the blood,—later colonies but of the same origin? Are some of them natural offspring of these adventurous emigrants, native as it were and to the manner born? And among these teeming myriads are there others still which have been derived by proliferation from the living bioplasm of the inflamed tissues themselves?

When the discovery was made of the facility with which blood-bioplasts pass through the walls of the vessels and the meshes of the softer tissues, and of the fact that vast numbers of bioplasts are engaged in these inflammatory migrations, there was a very general disposition indulged to consider all the bioplasts of pus to be emigrants from the blood.

But there is good reason to believe that bioplasts which have emigrated from the blood continue to undergo proliferation in their new habitats; and the origin of other bioplasts by proliferation of connective tissue-corpuscles, and by proliferation of inflamed epithelium has been so clearly demonstrated by thoroughly competent observers, as to be no longer doubtful. The rationale of these last processes is easily understood. In consequence of the inflammatory irritation there is an increased flow of nutritive material to the inflamed part, and an increased activity of nutritive appropriation on the part of the bioplasm of its structural elements. This bioplasm consequently grows rapidly, and instead of passing through its normal physiological transformation into formed material, undergoes rapid proliferation. The result is that the formed material which envelopes the bioplasm is rent into fragments and destroyed, while the newly formed bioplasts are set free to devour, to grow, to proliferate, and to wander without restraint, no longer conserving the natural functions of the organism, but quasi parasitic and destructive.

As a pathological phenomenon, then, we must admit the proliferation of the bioplasmic nuclei of the elements of the tissues. But it must be borne in mind that the proliferation

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extends only to the nuclear bioplasm, and not to the whole substance of the tissue-elements; that it is a pathological and not a physiological process; and that the products of the process are not tissue-elements but pus-bioplasts. For the most part, as has been said, they are parasitic and destructive. Whether they ever become naturalized in the organism, and subservient to the purposes of life has not as yet been specially investigated.

A question which has occurred to many is this, how is it that the blood-bioplast can be developed into so many different varieties of tissue-elements? How can the same sort of seed produce so many different sorts of fruit? There is only one answer, namely, this: That the special development of the germinal bioplast is determined by the action of incident forces, by the nature and nutrition of the part in which it takes place,—that is to say, that the character of the fruit depends very much on the soil in which the seed is sown and the influence of surrounding conditions.

Here, also, out of the study of phenomena such as these, rises into view the great law of infection; a law which has heretofore been recognized only as a law of pathology, but which, in accordance with the definition which has been given of pathology, as simply abnormal physiology, must manifest itself, also, as a law of physiology. In obedience to this law, a bioplastic germ developing among muscle-fibers becomes a muscle-fiber; developing among nerve-fibers it becomes a nerve-fiber, and so on. We see a sort of mixed example of the influence of this law of infection by contact in the influence which is exerted when a few scales of epithelium have been engrafted on the granulating surface of an ulcer. By the mere contact of the transplanted cells the adjacent bioplasm is transformed into epithelium, which soon extends so as to cover the ulcerated surface.

EXPLANATORY NOTE.

Here, for the present, this paper must close. I am fully aware how incomplete and defective it is, and would gladly

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make it better if circumstances were more auspicious. It has been written hurriedly, in the midst of many pressing engagements, and, worst of all, with but scanty access to books and authorities.

Nevertheless, I am satisfied that the statements of facts will be found to accord very generally with the latest observations. For the scientific or speculative use which I have made of the facts, I am, of course, responsible. If my speculations are sometimes a little startling, I am not the less satisfied that in the main they will turn out to be the true interpretations of many recondite problems in physiology.

It may be that sometime the opportunity will be afforded me of returning to the subject; and of filling up several gaps which occur in the physiological sketch which I have attempted; and, what is still more needed, to discuss in a way more nearly commensurate with their importance, the pathological relations of the white blood-bioplast, which so far have only been incidentally touched upon.

April, 1874.

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STATE AID TO HOSPITALS.

BY DR. P. BRYCE, SUP'T OF THE ALABAMA INSANE HOSPITAL.

When first requested by the President of the Association to prepare a paper for this meeting on the subject of State aid to Hospitals, I was honestly in doubt whether in these unpropitious times such a theme could command that professional attention, or elicit that general interest which it so confessedly deserves. I refer thus discouragingly to the times because the project presupposes, not only a high degree of benevolent and æsthetic culture and liberal statesmanship, but a commensurate degree of political, industrial and financial prosperity on the part of the commonwealth;—conditions, unfortunately, which do not obtain at this time in the State of Alabama.

But there are considerations bearing upon the question of eleemosynary enterprise—including the establishment of asylums for the deaf, dumb, blind and idiotic; hospitals for the sick and insane; reformatories for the intemperate; common schools for the masses, and colleges and universities for a select few—which concern a community, irrespective of the mere benevolent and humanitarian aspect in which we have been accustomed to regard it; and it is to these chiefly that I would invite your attention in the present very brief and very imperfect paper.

The functions of government, we all know, have come to imply, in modern days, something more than the protection of personal property or the guarantee of individual liberty.

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There has been superadded a species of communism, so to speak, which holds to the sacred maxim, which Bentham says Priestly first taught his lips to pronounce—that "the greatest happiness of the greatest number is the foundation of morals and legislation." An outgrowth of this new sociology is witnessed in the impetus given to benevolent and other organized efforts in the establishment of the numerous orders, societies, guilds, associations, trade-unions, granges, etc., etc., for the propagation and protection of special industrial, social and religious interests; and in the older and more densely populated communities, both of Europe and America, in the erection of hospitals and homes for the care and relief of all classes of suffering humanity. A very recent expression of this philanthropic spirit has been exhibited in this country, in the erection of hospitals for consumptives, paralysants and epileptics, and still more recently in the munificent endowment of an institution, near the city of Boston, for the exclusive care and treatment of that most abused, but not the least pitiable of all sufferers, the hypochondriac.

Taking the facts as here stated, we must find their solution not in the increase of religious sentiment, as some even in this sceptical age would have us believe, but in the growth and development of those eternal principles and instincts, so to speak, of self-preservation and self-interest, as well as of mercy and justice, which underlie our great social and political systems, and determine their relation to organized and benevolent effort in all its varied and multifarious manifestations. Plainly speaking, men have learned that the purpose of charity is no less to diminish the number of the ignorant and helpless than to respond to the dictates of an impulsive, and too often barren humanity, and that its ultimate effect would be to establish a social condition in which charity would seldom be needed. Some modern statisticians have even gone so far in this direction, as to reckon with mathematical niceness and precision, in dollars and cents, the exact value to the commonwealth of a sound human constitution, and have

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reached conclusions which, if we had the time to reproduce them here, would fill us with wonder and surprise.

It is chiefly, however, in the aspect of self-preservation that I would present the subject of State aid to this intelligent body of physicians. Waiving every other consideration which might be supposed to be operative in this direction, State pride among the rest, the principle of self-preservation alone would oppose an unanswerable plea to the policy that would prove indifferent to the health, no less than the morals and the material condition generally, of the community at large. In more exact language, it is the duty as well as the interest of the commonwealth to protect its citizens against the possible consequences of the disease, as well as against the possible consequences of crime and lawlessness. So far indeed as the individual is concerned, both are equally subversive of his happiness and equally beyond his power of avoidance and control. They differ only in respect to their origin, the one being indirectly a divine dispensation, the other originating directly in the acts of man, but both alike destructive of the well-being of society. The statutory prohibitions against crime and immorality, of every conceivable character, which fill our codes or remain unwritten in the common law, show with what system and regularity a part of these functions is performed, while the others, as we too well know, are often as studiously and as systematically evaded.

Restricting the discussion, however, to the subject immediately under review—the duty of the State to her hospitals—it is undoubtedly true that great progress has been made in this direction within the last century, and even within the last few decades. Infirmaries for the sick and the insane, and benevolent institutions of every kind are numbered by hundreds and thousands throughout a land where a few years ago there were scarcely a score. Boards of health are almost as numerous as boards of trade, and sanitary laws and restrictions are discovered to be almost, if not quite as important to the welfare and prosperty of the nation, as penal provisions against crimes and misdemeanors. The impulse in

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this direction, however, has not reached its maximum either in this country or in Europe. The State, so far as I am informed, in either country, makes no provision for treating disease of any kind except that of the brain, and this exception seems to be made because while other disorders do not necessarily impair the self-guiding powers, nor make men burdensome, insanity does both, and often makes them dangerous besides. Now while this might be sufficient reason why State aid should be extended to this class of indigent insane, does it follow that other classes should be excluded? Are the differences between mental and other serious physical disorders so broad as to justify such exception? Strictly speaking, are the innocent and helpless victims of ordinary disease less deserving of commiseration and assistance because their mental faculties are not also involved? On the contrary, does not the feeling of humiliation and dependency, which the lunatic is happily spared, augment the others' claim upon us for sympathy and protection?

We are discussing general principles, be it understood, and not the policy of inaugurating a more extended scheme of public charity in Alabama. The conclusion, however, is inevitable that there is sound economy as well as mercy in the plea for making the indigent, when sick or helpless, the wards of the commonwealth. A case of serious and protracted illness, for example, whether complicated with insanity or not, occurring in the head of a family of moderate means, is fully adequate to throw at least one person on the community for support, and is likely to drag the whole family down into pauperism. It is certain, therefore, that the fate of many entire families, and, to that extent, the number of paupers, depends upon the provision made by the public for enabling citizens to tide over periods of special trial and want.

In one word, the principle which these general remarks are intended to convey is well illustrated in the popular modern system of insurance of life and property, its operations being extended so as to embrace human infirmity, suffering and weakness of every kind; and all the citizens of the Common-

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wealth being both insured and insurer. Under this enlightened system, which, by the way, should be styled the Mutual and Equitable rather than Charitable, all the requirements and conditions of life insurance would be met and fulfilled with far more certainty, and at much less cost, than under any other. The burden, which falling upon the individual would crush him out, such a system would equalize and distribute so as hardly to be felt; and under the high statesmanship which should govern and control it, large returns, in the shape of material prosperity, might most confidently be expected to accrue.

We have in the foregoing prefatory remarks, attempted to show that the common weal and well-being of the State depend upon the welfare of individuals; and that the former is specially called upon by self-interest, as well as by duty, to remedy or remove, on the part of the latter, all those obstacles which are known to be detrimental to their industrial productiveness and powers of self-guidance and support. We come now to the application of these general principles to our own State, with reference to her obligations to those public and charitable institutions which, by reason of existing laws, she is bound to foster and protect. And foremost in this category we would place, for obvious reasons, the Hospital for the care and treatment of persons of unsound minds. To this Association is due the honor of having made, during its annual session, in the city of Selma, in the year 1850, the first official call upon the Legislature for its establishment; and to the determined energy and zeal of the late Dr. A. G. Mabry, a citizen of Selma, and an active member of this Association, is mainly owing its ultimate successful accomplishment. Under the auspices, and by the direction of this Association, commissioners were yearly sent to the lobby of the Legislature in order that the matter might be brought personally and forcibly before the members, in their individual as well as corporate capacities. That no legitimate means should be left untried, Miss D. L. Dix, the great philanthropist in this department of human wretchedness and misery, was summoned to aid,

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in the appeal of the commissioners, to the hearts and consciences of the law-makers. Among other things she said in one of her memorials to the Legislature: "I come as the advocate of the helpless, forgotten, insane and idiotic men and women; of beings sunk to a condition from which the most unconcerned would start with horror; of beings wretched in our prisons, and more wretched in our almshouses; of beings confined throughout the State in cages, closets, cellars, stalls, pens!—chained, naked, beaten with rods and lashed into obedience!"

As may be readily inferred, these energetic measures were crowned with abundant success, and the Act providing for the erection, organization and support of the Alabama Insane Hospital, was passed almost unanimously by both Houses of the Legislature, and approved by the Governor on the 6th day of February, 1852. In the summer of 1861, nearly ten years after the passage of this Act, the buildings were declared ready for the reception of patients. Since that time, embracing a period of nearly twelve years, the institution has been in successful operation, and there have been received and treated nearly *one thousand* patients, about two-thirds of whom have been returned, either cured or greatly improved, to their respective homes, and three hundred and thirty are remaining under treatment at the date of this present writing.

Such, in brief, is the history of this splendid Institution—the pride of the State, and emphatically the creation of the State Medical Association—and had this distinguished body accomplished nothing else, this single achievement would have entitled it to the praise of a grateful people, and have repaid its founders for the labor, expense and responsibility of its organization. It is, indeed, a monument to the philanthropy and wisdom of the medical profession of Alabama, who first conceived the idea, as well as to the Legislature which put it into execution!

As the medical superintendent of this Institution, it is made my duty to report its condition annually to the Trustees, and through them to the Governor and Legislature of the State.

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In my report of 1871, I called attention to the crowded condition of its wards, and asked either for an extension of the present building or the erection of another Hospital elsewhere, at some convenient and suitable point in the State. In 1872, I again brought the matter prominently before the Legislature, giving additional reasons and arguments in favor of making further provision for the accommodation of this helpless and unhappy class. In my last report, (1873) I record the fact that fully one-third of those who applied during the year for admission, were rejected for want of room, and that the Hospital was unable to meet the demands of that class for which it was intended. These several appeals were made with all the force and feeling of which I was capable, and were accompanied with the usual arguments and invocations of sympathy and mercy in behalf of this, the most pitiable class of human sufferers. It was urged in reply that the condition of the State did not justify the expenditure of the sum necessary for the purposes indicated; and while the claims of the insane were freely and fully acknowledged by our legislators, they believed that the times were too inauspicious to justify their immediate liquidation. Under the peculiar coincidences mentioned above, with reference to this Association and the city of Selma in connection with the origin of the Hospital for the care and treatment of the insane, this would seem, if not a Providential, at least a most fitting occasion to bring this whole matter again under discussion. There are in the State of Alabama about seven hundred persons of unsound mind, exclusive of idiots, that ought to be placed for safe-keeping and treatment in hospitals erected specially for the purpose. Half of this number are already so provided for; the remainder are scattered in the county jails and poor-houses, or remain a burden upon their friends and families. The same necessity for the humane care and treatment of these unfortunates that existed in 1852, when their claim was first brought by Dr. Mabry before the Association, exists to-day; and if this body would prove true to its antecedents and to its present obligations, steps will be taken at once

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to procure such legislation as will meet the necessity, and at the earliest practicable moment provide for all the wants of the insane.

Whether these wants can be best subserved by the erection of another hospital in a different section of the State, or whether the present building should be extended so as to accommodate six hundred patients, which is the largest number it has been found expedient to treat together under one roof, are questions for your further consideration. Of the two plans, however, a second hospital situated about midway on the line of railroad between Montgomery and Mobile, or at another suitable point where all the conditions of healthfulness and an abundant supply of good water were fulfilled, would seem to be the most convenient, while the enlargement of the present hospital at Tuskaloosa would possess the advantage of economy. The Association, with which we now rest the entire matter, is fully competent to balance these advantages, as well as to determine all the conditions involved in the enterprise; and in its decision we cheerfully acquiesce.

I next invite your attention to the Alabama Institution for the Deaf, Dumb and Blind, which, though not properly a hospital for the treatment of disease, is nevertheless under medical supervision, and sufficiently cognizant of certain human infirmities to bring it under our professional notice. The act incorporating this excellent institution, which is located near Talladega, was approved by His Excellency Gov. A. B. Moore, January 27, 1860. The entire cost of the building, including the original purchase and subsequent appropriations, is just thirty-four thousand dollars; and it is supported by the State at an annual expenditure of about eighteen thousand dollars. Since its opening in 1860, one hundred and forty-four pupils have been admitted, "most of whom," says Dr. Johnson, the skillful superintendent, "have been materially benefited, and are now engaged honorably and profitably in the battle of life." The commissioners, in their report for 1873, speak in the highest terms of the results of the institution, and its general management. "No citizen of Alabama," they truly

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say, "can visit it without feeling proud that the State has established an institution for the education of its unfortunate mute and blind children." There are ninety children under training, and the present accommodations are sufficient for present purposes.

The instruction of deaf mutes and the blind, so as to counteract the undesirable effects and disturbing influences of a special infirmity upon their character and habits of life, and to make them, as much as possible, like ordinary men, and fit and prepare them for ordinary social life, has become one of the demands of the age in every civilized country. In Europe, especially in Germany and France, rival systems of instruction have sprung up, each pressing its claims for superiority, and all going to show the great interest, and even enthusiasm entertained by these respective governments for this interesting class of persons. Alabama has aligned herself in the front rank of progressionists in this department, and will not fail to respond when called upon in behalf of her institution for the deaf and blind.

At a meeting of this Association held in the city of Mobile, in March, 1869, Dr. J. S. Weatherly read a highly interesting paper on the habit of opium-eating, and closed with the following resolution, which was adopted:

"*Resolved*, That a committee of three be appointed to confer on this subject with the Superintendent of the Hospital for the Insane, at Tuskaloosa, and petition the Legislature to grant authority to commit inebriates and opium eaters for treatment in that institution."

The reply of the Trustees of the Hospital for the Insane, to whom the matter was accordingly submitted, has already been published. They showed that it was neither practicable nor proper to receive either class, named in the resolution, in the wards with the ordinary insane; and if it were otherwise, the want of room would defeat the measure in Alabama. At the next meeting of the Association, held in Montgomery the following year, this matter was again brought forward and discussed, showing the great interest felt by those, who, in the

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intimate relation of family physician, were brought in most frequent contact with this terrible, and wide spreading scourge, intemperance. About this time, and subsequently, my professional opinion and advice was so frequently sought in behalf of these unhappy victims of alcoholic intemperance, and I became so deeply impressed with the importance of investigating their condition, that I undertook to present, somewhat at length, in one of my annual reports to the Trustees, the most advanced views of its pathology, with some original suggestions concerning its treatment and permanent cure. As the subject is still of great importance, and my views have undergone no material change since then, I shall tax your patience by reproducing so much of that discussion as may be necessary for its intelligent presentation again in this communication.

We had written out and incorporated in this paper a number of cases, illustrative of the phases of this most intractable disorder, which, in its supposed relation to insanity proper, has received from some writers the euphonious name of Methomania; but the experience of every physician present here to-day will supply what the lack of time, and a proper consideration for the patience of others compels us to omit. The following summary of views, however, respecting its pathology, which I gather from a valuable paper on the influence of methomania upon business and criminal responsibility, recently published by Dr. Rogers, of New York, are of value in determining the propriety of legal interference with the liberty and freedom of the inebriate. The object of the paper is to prove that the morbid desire for alcoholic stimulus "is a positive expression of brain disease"—in other words, that it is insanity, and ought to be regarded as such. He says that methomania has been considered by the highest medical authorities, for many years, just as much a mental aberration resulting from diseased brain, as suicidal or homicidal monomania. In support of this statement, he quotes the following authorities: Dr. Hutcheson, in his report of the Glasgow Lunatic Asylum, published more than a quarter of a

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century ago, treats of it as a form of mania, as a brain and mental unsoundness which renders the victim of it irresponsible for his acts during its paroxysms. Dr. Carpenter, in his essay on Alcohol, written a few years later, speaks of it as "one form of insanity," and as generally having a sufficiently peculiar relation to alcohol to demand a notice of it in such a paper. Forty years ago or more, Dr. Woodward, Superintendent of the Lunatic Asylum at Worcester, Massachusetts, wrote a pamphlet upon this subject, urging the establishment of an asylum for the care of these persons, on the ground that they were the victims of a disease over which they had no control, and which rendered them irresponsible for their acts, and dangerous if left at large. About the same date Dr. Roesch, a French writer, published a paper upon the effect of the excessive use of alcoholic drinks, and is credited by some authors with having first called the attention of the profession to methomania as a disease. Dr. J. E. Turner, the distinguished founder of the New York State Inebriate Asylum, in his report to the Legislature, in 1864, speaks of this disease in the following language: "Every case of inebriety is a suicidal case of insanity, which needs the control and medical treatment of an asylum more than any other class of insane."

Dr. Tyler, whose opinions we regard as possessing the greatest weight, speaks of this affection as follows: "Pathological investigations show that the brain is changed from a healthy to a diseased state by the action of alcohol. Healthy thoughts and healthy moral sentiments are not evolved by a diseased brain. To its possessor we attach no moral responsibility. An inebriate has a diseased brain. No will or agency of his can bring forth therefrom other than diseased mental and moral products. A person who is governed by an uncontrollable appetite, or by an uccontrollable influence, is not a responsible being, and should be so treated."

Dr. Ray, the present Superintendent of the New York State Inebriate Asylum, and late Superintendent of the Washingtonian Home for Inebriates, Boston, in his report for 1867, says: "The extent to which the morbid craving for stimulants, and

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the infirmity of will in resistance, which combined constitute the disease, having its source and sustenance in the impaired functional activity of the various organs of the body, can only be appreciated by one who has carefully observed it in a large number and variety of cases. As a disease, its character is most complex and obscure, involving as it does abnormal conditions of both body and mind, and varying in every case with individual temperament and characteristics."

A commission appointed by the State of Massachusetts, some four years since, to report upon the condition of the asylum of that State, in speaking of this form of insanity, classes it as a disease under whose paroxysms or influence the victim should be cleared from criminal responsibility. Under the conviction that the methomaniac is a victim of an uncontrollable desire, and therefore dangerous both to himself and those about him, and hence a fit subject for the interference of the State, more than 1,500 medical men of this State signed a petition to the Legislature in 1857, in favor of the establishment of an asylum for that purpose. In that petition we find the following paragraph: "Without such an institution the physician has been compelled to turn from his patient discouraged, disheartened and defeated, and the victim of this painful malady has found a drunkard's grave. With this institution we can save hundreds who are now crowding our insane asylums, inundating our courts, dying in our prisons, and perishing in our streets." Dr. Anstie, in his article on Alcoholism, "Reynolds' System of Medicine," says of methomania: "It is, of truth, rather a variety of constitutional insanity than of alcoholic disease, but as the outbreaks owe many of their characteristic symptoms to the influence of drink, the disease requires notice in a treatise on alcoholism."

Such are a few of the facts going to show that habitual intemperance is a certain indication of organic disease of the brain, which, if it does not constitute insanity proper, must be admitted to impair the mental faculties and to that extent relieve its victims of criminal responsibility. There are many other points of interest, in the same connection, going to prove

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that the inebriate possesses an abnormal cerebral conformation, especially where the tendency has been transmitted by a drunken ancestry,* or where the habit has followed an injury of the head or a protracted illness, but enough has been said for the present under this division of the subject, and we pass on to the treatment.

Whatever differences may exist in the opinion of medical men as to the terminology and pathology of habitual drunkenness, it is now conclusively demonstrated that its treatment by isolation, in establishments, or hospitals of some sort, affords the best, and in some cases the only remedy for its alleviation and cure. Accordingly, in late years, there have sprung up, in several of the Northern States, Asylums and Hospitals expressly for the accommodation of inebriates from the excessive use, or abuse, both of alcohol and opium. These institutions, if I am correctly informed, are generally owned and controlled, under sanction of the law, by private individuals or stock companies, receiving in some instances from the State occasional aid or stated sums for the support of a certain number of indigent inebriates. In completeness of appointments, and in everything pertaining to elegance, refinement and even splendor in external arrangements, many of these establishments are truly palatial. Their charges for board and treatment, as might be supposed, are in strict correspon-

*What a fearful picture is that drawn by M. Voisin in one of his latest studies on the effect of drunkenness on conception! As the result of seventeen cases which were fully examined, it would appear that wine, brandy and absinthe exercise an almost identical influence upon the products of conception. Epilepsy, convulsions in childhood, and chronic myelitis are the possible consequences of conception during drunkenness, whatever the intoxicating agent may be. In eighteen cases of conception during chronic alcoholism, without drunkenness, observed, there were born eight idiots and ten epileptics. Of the eight idiots, four were the issue of fathers who indulged in wine, two of brandy drinkers, and two had mothers who drank brandy. Of the ten epileptic children, five had fathers who drank brandy and wine, three who consumed only wine, and two who intoxicated themselves by absinthe. With such an army of results before us, the most urgent step toward natural selection just now is, either for men to check increasing drunkenness or else to protect wives in their control over their own bodies.—*Medical and Surgical Journal.*

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dence with their outward appearances, and of course far beyond the reach of the poor or even the man in moderate circumstances. I made application, on one occasion, to an institution in New York in behalf of an unfortunate but promising young man, and was told that *twenty dollars per week was the minimum cost* at which he could be admitted; and that he could not remain under any circumstances longer than three or at most six months!

If such institutions were at all adapted to the cure of intemperance, the facts recited above would limit their usefulness to so small a number as to make them practically of no benefit to the public at large. But the truth is, no system of treatment based upon the voluntary submission of the inebriate, and restricting its term to six months, or even one year, can ever prove successful in the cure of a disease of all others the most intractable and ineradicable. Inebriate Asylums, therefore, founded and governed upon the voluntary system, however imposing their pretensions or boastful of results, must necessarily, from the very nature of the disease which they profess to treat, prove failures in the end. Like the order of Good Templars and other similar societies, they may arrest for a time the gratification, at least, of the uncontrollable and debasing appetite, but the relief they give is only temporary. This judgment has been pronounced upon them time and time again by those who were in positions to determine with accuracy the nature, extent and results of their curative operations, and the sooner the public are made to believe it, the better it will be for all that class of deluded creatures, and their no less deluded friends, who are led to expect a reformation from intemperance on the easy terms and light conditions imposed in their attractive curriculums.

If our conceptions of the nature and force of this habit, as determined from the foregoing review of the opinions of intelligent and observing men, as well as from our own limited experience, be correct, no self-imposed restraint can stay the victim in his onward course to destruction. Nothing but the strong arm of the law can reach his case. Time, likewise, is

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necessary to remove the cerebral impression upon which we have shown the habit to depend. Reforms, extending over one, two, and even many years, followed by relapses, debauchery and death, are not unfamiliar to many of us, and lead us to condemn most emphatically any system of cure that does not extend over several years at least.

The establishment of a REFORMATORY FOR INEBRIATES of all classes, under the jurisdiction of the Courts, seems in the opinion of the writer to afford the surest, if not the only prospect of attaining ultimate success in the treatment and permanent cure of chronic inebriation, and I seize with avidity upon the present occasion to bring the matter to the consideration of the Association. A minute description of this ideal reformatory has already been published in my annual report to the Legislature, before referred to, and was reproduced and endorsed *in extenso* by my esteemed and accomplished *confrere*, Dr. Benj. H. Riggs, in his admirable paper on the subject of DRUNKENNESS AND ITS REMEDIES, read before this Association at its annual session in March, 1871. It was stated there that the excessive and persistent use of alcoholic stimulants, either regularly or periodically, to the extent of disqualifying the individual for the proper performance of his ordinary business engagements and domestic obligations; or to the extent of producing mental and bodily impairment, followed by an alteration of character and failure to observe the common proprieties of life at home and abroad, should constitute the qualifications for admission to this Reformatory for Inebriates. The facts to be brought before the grand jury, and on the finding of a true bill, the case to be investigated by a commission impanneled, or appointed, especially with a view to its competency to decide the same; the term of confinement not to be less than two, nor more than five years; the treatment to be conducted by an educated physician, and all the expenses to be borne by the State; voluntary inebriates and others desiring to bear their own expenses, to be admitted without the exposure of a public trial.

Thorough discipline was shown to be indispensable, in the

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management of the reformatory, but it should not be harsh nor too exacting, nor should this institution be allowed to degenerate into a mere punitive establishment; the patients to be suitably employed in such occupation as would likely prove remunerative to the State and beneficial to themselves; and the officers and nurses to be selected with a view to their fitness, intelligence and capacity for the work.

Such is the general outline of a reformatory which I deem not only eminently practicable, but absolutely essential to the cure of the evil against which it is directed. Apart from its direct curative results, its moral effects upon the habitual drinker and the novice, in restraining the habit within proper limits, or in tending to break it up before it becomes fixed; and upon the young, especially those who have inherited the tendency, can hardly be properly estimated. The danger of relapsing too, which we have shown to be so imminent even in those who have undergone treatment and are restored, will be materially lessened by the mere presence of so formidable an agent.

I am not aware of the existence anywhere of such an institution, but impressed as I am with its necessity and practicability, I should like to see Alabama take the lead in an enterprise which, I confidently believe, will be, sooner or later, generally adopted, and I earnestly commend the measure to the consideration of the State Medical Association.*

Our late President, Dr. Geo. E. Kumpe, in his able annual address, delivered before this Association last March, animadverted briefly, but with a show of genuine feeling and with

* Since writing the above, my attention has been called to a late Report of the Commissioners of Public Charities in the State of New York, which is highly significant and suggestive of the great change taking place in public sentiment on this very subject. They think the present mode of treating inebriates in the city of New York by ten days confinement on Blackwell's Island, "not only ineffectual and expensive but mischievous, and in no sense reformatory." They suggest "*that where the individual arrested has been guilty of a chance indulgence, a detention until sober will be a sufficient punishment, but that habitual drunkards ought to be committed to the work-house for terms long enough to make possible some lasting reform in their habits.*"

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great fairness, upon the present system of medical education in the United States. He says, what we know to be true, that our medical colleges are awarding their honors to men utterly unprepared to assume the responsibility of taking charge of the health and lives of the communities in which their lot may be cast. "This," he continues "will no doubt be the case as long as medical colleges are the private property of a few individuals, and the profits arising therefrom depend on the popularity of the institutions, and this popularity upon the comparative ease with which a diploma may be obtained. So long as this state of things exists, the medical profession will be flooded with incompetent members, and its respectability, position and usefulness will be greatly impaired." He closes with the interrogatory—to which, however, he attempts no reply—"HOW CAN WE PREVENT IN FUTURE THE ADMISSION OF INCOMPETENT PERSONS INTO THE PROFESSION?" This important question, as we shall proceed to show, is intimately connected with the theme of our present paper, and falls fully within the scope of the general principles laid down in the beginning. We propose, however, to occupy but a very short time in its discussion, and in consideration of your indulgence will confine our remarks strictly to the interrogatory of the late President of the Association.

More has been said and written, perhaps, on the subject of MEDICAL EDUCATION, both in our State and National Associations, than upon all other topics combined. It has been presented in every conceivable aspect and under every possible condition, and has become threadbare if not entirely exhausted, and there is to day no member of this Association who is not already fully impressed with its bearings, upon the honor, welfare and integrity of the profession he represents. So plainly and so repeatedly, indeed, have the deteriorating tendencies of the prevailing systems of medical education been portrayed by our best men and best physicians, that none can have failed to perceive and deplore them.

Some have sought a remedy for the evil in a system of uniform and sufficiently remunerative charges for medical tuition

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in the various universities and colleges throughout the land. Others would make a liberal or classical education, on the part of candidates for the degree of doctor of medicine, a *sine qua non* of admission into the ranks of the profession; while others again would subject to a censorial examination all the candidates for practice, irrespective of their college diplomas or degrees. With due deference to those who hold or advocate these views as in any measure remedial of the evil in question, we beg leave to record here, most emphatically, an honest difference of opinion.

The system of uniform charges alone, at rates sufficiently remunerative to secure the services of first-rate teachers—a condition, by the way, which is indispensable—is open to the objection, so cleverly made by Dr. T. C. Osborn, a former President of this Association, in his annual address in March, 1872. "The *eclat*," he says, "of a long list of matriculants is greatly too fascinating to be resisted by the best of medical colleges, however large their pretensions may be for the honor and dignity of the profession, and however respectable and well qualified the teachers may be who adorn their splendid lecture rooms." The Doctor, to avoid putting too fine a point upon it we suppose, generously refrained from supplementing "the *eclat* of a long list of matriculants," with "*the increased moneyed reward*," which, in the language of a distinguished and popular teacher of medicine in one of our largest southern universities, "*has become the only inducement for the enormous labor of teaching.*"

So far indeed from correcting the evil by any system of charges, or fees for tuition, the tendencies are, as our colleges are at present organized, in directly the opposite direction. The greater "the moneyed reward," the greater the temptation to lower the standard and accommodate the curriculum to the capacities and wants of the largest number of pupils. Under their present organization, the great problem to be solved by these colleges is not how to elevate the standard of medical education to the highest requirements of the profession, but how to lower it so as without loss of reputation, to include

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the largest number of graduates, and to realize the largest possible income. This, we affirm, and it cannot be denied, is the natural tendency; we do not say the universal practice.

No system, on the other hand, of *purely gratuitous instruction*, as a matter of course, is adequate to bring about the desired reformation, nor do we suppose that such claim has ever been made in its behalf. It is doubtful, indeed, if any such system, even if successfully inaugurated, could be perpetuated or long maintained under the most favorable circumstances. The examination of candidates, both for the study and practice of physic, by Censors, as contemplated in our new constitution, and enjoined in the annual addresses of our former Presidents, we believe will prove unavailing, except to a very limited extent. But it is not the design of the present paper to enter upon an exhaustive discussion of the several schemes of medical reform proposed by others, nor to do more than indicate, in most general terms, the difficulties likely to be encountered in their practical application. This much, however, was necessary to introduce a scheme of our own, based upon the aid and co-operation of the State, which we believe to be practicable, and which in our judgment, promises a speedy and sure success.

Throughout the American Union the obligation on the part of the Commonwealth to educate the masses, both in common schools and universities, is admitted, and without exception, we believe put into practical operation. Special colleges for instruction in the physical sciences, in law, and even in medicine, have in some of the States, been superadded to these educational institutions. In Alabama we have a law school, with salaried professors, attached to the State University, and there is no citizen in the State, we venture to affirm, who questions either the wisdom or the policy of this special provision. It is no less true of the State than of the individual, that her best investments are in the facilities for a thorough and extended education of her children. It is only through an unbroken succession of enlightened statesmen that her *prestige* and honor as well as her usefulness, are to be perpet-

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uated. While, therefore, it is eminently proper that the State should secure to her citizens, through an educated bar, the enjoyment of their rights and property, it seems to be of equal if not paramount importance, that their health, their lives, and to a great extent their domestic happiness should receive at least equal protection. But this is not all; the profession of medicine, unlike that of the law, is, to a very considerable extent experimental and progressive, and there are no reliable standards nor tests except success, which is too slow to be available, by which to measure the pretensions of the candidate for popular favor. Communities are therefore more powerless to protect themselves against charlatanry than pettifoggery, and since, too, the issues of the former are of greater moment, it follows that it is the duty of the State to interpose the strong arm of the law in their prevention.

Admitting the force of this reasoning, the question next arises, how can this interposition be best effected? We reply, by the thorough organization and appointment of a State Medical College, supported by the State, and controlled either directly by this Association as trustees, or indirectly by this body through the Faculty of the College. Its location should be determined with reference to the facilities for the prosecution of practical anatomical and clinical studies. The Faculty should be composed of men most distinguished in their several departments, without reference to their nationalties; they should be liberally paid by the State, and in no wise made dependent upon, nor in any way participate in or control the revenues of the institution from patronage or other sources. The curriculum of studies should embrace, as far as possible, all the theoretical knowledge necessary to the intelligent comprehension of the well known laws of health and disease. The question of fees for tuition is of secondary importance, and its expediency would depend upon the ability of the State to support the institution without aid from its pupils. If the usual fees, however, were required, it would soon prove self-supporting. The term of study would be determined by the proficiency of the pupils. Carrying out the idea of medical

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censorship, incorporated in our new constitution, the Faculty of this College should constitute that body, and physicians from other States and graduates of other colleges, intending to practice medicine in Alabama, should be required to pass a satisfactory examination before them. This last suggestion, besides embodying in a practical form Article 57 of the new constitution, guarantees to the people of the State at large a corps of reliable physicians, into whose hands their lives may safely be trusted, and offers the strongest inducements to medical students in Alabama to encourage and build up a Medical College of their own.

The effect of such an institution as we have described, throughout the entire length and breadth of our land, would be such as even the most sanguine of us have failed to anticipate. Under the stimulus thus administered to medical education, other States would be forced, sooner or later, either from pride or necessity, to the adoption of similar measures. Every State in due time would have its own Medical College, organized and operated with a view solely to the public good, and among them all there would necessarily spring up such a spirit of competitive progress and honorable emulation, as would tend to elevate the medical profession in America, and confer upon it that dignity and respectability which it justly deserves, and has fully attained in some of the older communities of Europe.

In conclusion, we crave your indulgence for the great length of this paper. Perhaps it has undertaken too much, since we are fully conscious of having left unsaid much that is important in the elaboration of our views. Whatever may be considered in any of the foregoing suggestions either new, or a departure from established usages, we have advanced with great diffidence, and shall continue to hold in highest respect those great and good men of our profession who fail to recognize either the expediency or the obligation of the State to furnish her aid in the directions we have indicated.

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CONTRIBUTIONS OF PHYSICS AND CHEMISTRY

TO

PRACTICAL MEDICINE.

BY T. O. SUMMERS, M. A. S. A.

Perhaps the greatest obstacle to the progress of thought is the so-called *practical man.* Seldom, indeed, do the grand generalizing premonitions of science come to the discoverer clothed in the garb of utilitarian conception. And yet, standing as we do face to face with those splendid discoveries in the past history of the world of mind, which, with all the freshness of their incipient beauty, were barren of utility—discoveries that to-day, in their grand practical results are driving the mighty machinery of the universe—who is he that dares to stamp the widest generalization of theoretical conception with the withering commentary of a restless impatience or sordid sarcasm—"*Cui bono?*" Strange, indeed, above all things does it seem, that in the face of all the revelations of science which are passing in panoramic view before the mind of the present day, with all the splendor of apocalyptic vision, there can be found those who turn listlessly or disdainfully aside to pursue the covetous calculations of what they are pleased to call *practical utility.* These are the canker-worms that eat at the very heart of progress—these the multitudes to whom the loaves and fishes speak in far more wooing language than words of wisdom clothed in all the God-like beauty of Truth. Thanks to the noble men of the past, whose untiring energies and fecundity of thought

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have wrought out for us the great results of the present—the age of philosophic stones and elixirs of life is gone only to be remembered among the Sinbads and Aladdins of Arabian fancy. But there is a spirit among us, which, in its influence upon progress, is far more withering and deadly than the dreams of the Alchemists whose very incantations cradled the infancy of Science. Nor has the progress of medicine escaped the baneful effects of this upas power. Witness it in the dusty and often empty book shelves of the practitioner, his barren office decorated only by his suspended slate and list of fees. Speak to him of microscopes and test-tubes, and he will smile at your impractical simplicity. Go to the halls of medical learning, watch the listless Beotian stare upon the countenances of hundreds of students as with note-book and pencil they await the passage of the lecturer through the dull, dry details of etiology, clinical history, pathology, diagnosis and prognosis—till the word *treatment* falls like magic upon their ears, when the pencil is grasped and the note-book eagerly opened to record that only in which they, as practitioners, are presumed to be interested. Can we wonder, then, at the slowness of our march, at the bold empiricism that infests our ranks? Not long since I was severely stung by a remark made in my presence, by an eminent divine upon the Episcopal bench, to the effect that medicine at its best is but a system of empiricism without the shadow of a rational foundation, and that all claims to anything higher than this were the cunningly devised bombast of the pretentious practitioner to dupe the multitude upon whom he feeds. Now, however much I felt the fling at my profession from one who has been so faithfully and freely served by the physician, both personally and as the representative of his class, I could not but recognize the fact that the ordinary practice of the day was indeed open to the charge in a most lamentable degree. But the efforts of organizations to develop and inspire the spirit of original investigation are not without their fruits, and the future is full of hope.

But let us to the point.

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When I received from the President the notification that I had been appointed to report upon the Contributions of Physics and Chemistry to Practical Medicine, I could not refrain a smile. The question presented itself to my mind: To what else, indeed, can practical medicine look for contributions? Belonging as I do to that class of physicists who reject as utter twaddle all hypothetical pratings about an *organogenium* or latent vital force, separating and differentiating the human organism from the elements of the so-called inorganic world, and freeing it from its laws, by the superior power of its antagonism, I could not but wonder where I should draw the limits of this discussion, and to what end I should direct the current of my thoughts.

Physics—the science of molecular relations—how, indeed, could practical medicine move one step without reference to its laws? What infinite variety of pathological conditions grow out of molecular disturbances in the organism! Witness the complicated phenomena of absorption—the gate-way to the system. What have we here but the operation of the simple laws of capillary action? What a grand generalization do we arrive at in this! Solution, then, is necessary, and this directs the introduction of aliments and the administration of remedies. There is an element wanting in the organism. Nothing seems simpler than to supply it. But there is that inexorable physical law standing as a grim sentinel at the outposts of the system, and demanding the countersign of solution. Here the field of investigation widens. The molecular structure of the membranes through which all nutritive and remedial substances must pass, demands investigation, and this opens up to our view those ultimate molecular aggregations called bioplasm, that regulate by elective affinity all organic assimilation. The eyes of investigators now turn to these with eager expectation. Much has been already done in the way of regulating the absorptive functions of the organism, by a simple compliance with the known laws which regulate them, and from the well directed diligence of Huxley, Beale and others we are to-day in possession of facts with regard

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to the physical laws of ultimate structural elements, which promise most valuable results.

Again the phenomena of the nervous system are all in direct obedience to the laws of Physics. The impact of sound waves upon the tympanum, of light waves upon the retina, and of other forces upon the periphery communicates to the nerves involved a vibratory molecular motion, which is resolved into a sensation corresponding in character and intensity to that of the originating energy. Thus we have been able to imitate in various ways, this peculiar vibration of the nervous molecules so as to supply the visvervasa. Who that has witnessed the wonderful effects of electricity in its remedial application to pathological conditions of the nervous system, can fail to recognize the purely physical conditions which govern its operation. Having been once brought to recognize the correlation of the nervous force with the ordinary manifestations of physical force around and without us, we have a fulcrum for our lever of investigation. To a proper understanding of the laws of light and sound, much of the advance in opthalmic and aural surgery is due. The laws by which different media affect the transmission and reflection of sound have given rise to the comparatively new science of physical diagnosis.

The phenomena of the circulation have all a distinct physical basis, the mechanical force of the heart and muscular walls of the arteries, the valves of the veins and capillary action being the forces active in carrying it on.

Physics thus stands directly related to practical medicine as being that science to which all the molecular relations of the body are referred, and under whose laws they are immediately governed. Well has the Abbe Hauy said, that "those specious causes and imaginary powers, to which in the Middle Ages, all natural phenomena, even those of an astronomical kind were referred, but which, through the genius of Newton and Laplace, have been banished from the celestial spaces, have taken their last refuge in the recesses of organic beings,

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and from these retreats positive philosophy is preparing to expel them."

The physiological conditions of the human organism being constructed to such a large extent upon a purely physical basis, we can readily understand how directly dependent upon the laws of Physics are the countless pathological manfestations with which it is the office of the practitioner to deal.

But the indirect contributions of Physics to Practical Medicine are by no means to be regarded as less important in the significance of their results.

These are seen in the numberless instrumental appliances with which it furnishes the practical observer for the prosecution of his investigations.

Need I here occupy your time with a eulogium upon the wonderful revelations of that grandest of all aids to medical research—the *Microscope?* And yet, I fear if the number of microscopes belonging to this Association were taken, it would develope a lamentable necessity for pleading in its behalf.

And yet without its simplest revelations how terribly dark would be the Science of Medicine to-day. Can you for a moment, imagine any scientific treatment of pathological conditions that does not regard those histological characteristics which only the microscope can reveal.

Were it only this, that the ultimate physiological structure of the organism were thus made known to us, there would be at least one solid spot where reason could rest its weary pinions and plume them for further flights in the vast unknown beyond. But, to say nothing of its never failing positive pronouncement upon the nature and pathological significance of morbid growths which are visible *en masse* to the naked eye, it can plunge into the very penetralium of structural organization, and sound the alarm of disease and danger when the freshness of external beauty is blooming in the eye of youth, and the rosy flush of health is yet kindling on its cheek.

Without stopping to detail further the importance of its

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results, I may only add that no diagnosis is complete without reference to this tribunal, which never errs in its judgments or misleads in its indications. May we not hope that the day is not far distant when the positive deliverances of the microscope will forever supersede the blind formulas of therapeutical speculation and the stereotyped prescriptions of the Dispensatory and Pharmacopeia.

There is a late contribution, however, of Physics to Practical Medicine, which at the present time deserves our especial attention. I refer to the Spectroscope in its application to physiological and pathological research.

It has long been known that certain bodies have at the ordinary temperature, the power of selecting a kind of light and absorbing it. When white light is passed through Iodine vapors, before falling upon the prism of the spectroscope, the resulting spectrum will be seen to be crossed by a great number of dark bands, which are always seen in exactly the same position upon the Spectrum. So when the light passes through the red fumes of hyponitric acid the spectrum is crossed by many dark lines which occur, however, in different positions and of different breadths from those given by the violet vapors of Iodine. This elective absorption is very marked in the case of many liquids containing various coloring matters.

If light, for example, be passed through a solution in ether of chlorophyll, the green coloring matter of leaves, dark bands will appear in the red, yellow, green, and violet portions of the spectrum, and the blue shades give place to a faint red hue, showing that the green chlorophyll solution does not therefore absorb the whole of the red and yellow rays, but only those which possess a peculiar refrangibility or wave-length. It exerts the same influence on most of the blue and violet rays, while it transmits unchanged all the other colors of white light.

If, now, a greatly diluted solution of fresh arterial blood be substituted for the leaf-green the red in the spectrum will be intensified, while the blue and violet will be nearly ex-

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tinguished. In the yellow and commencement of the green two dark bands, with a faint green stripe interposed. This is due to the oxyhæmoglobin, for deoxidized blood gives only one band somewhat similar to that given by the coloring matter magenta, but not indentical in position. From this is established the fact that the coloring matter of blood, like that of Indigo, is capable of existing in two states of oxidation, distinguishable by a difference in color and a fundamental difference in the action on the spectrum. By the action of an acid on blood the cruorine is converted into haematin, yielding a different absorption spectrum—having three well-marked bands. So, also, blood containing very small quantities of carbonic oxide-gas in solution exhibits a very peculiar set of bands. So that without going further into the description of details, which the limits of this paper forbid, we see at once the important place this instrument is destined to occupy in pathological investigations. I have used it as a means of diagnosis by way of experiment in complicated researches and it has ever proved a most valuable auxiliary. I present you herewith a most convenient form of pocket-spectroscope, which is available for all practical observations upon the fluids of the body. It is manufactured by Browning, of London, though it can now be obtained for the small sum of fifteen dollars from any dealers in chemical and philosophical apparatus in this country.

The combination of the microscope and spectroscope by Messrs. Sorby & Browning, giving rise to the new instrument known by the name of the Sorby-Browning Micro-Spectroscope, has furnished us with the means of detecting and reading the most delicate spectral reactions, which would not be visible to the naked eye, such as that given by one blood-corpuscle for instance. Here the field widens to our view, and the very keys of life itself are, as it were, almost within our grasp.

Time would fail me to speak of the wonderful pathological revelations of the thermometer, the atomizer, the stethoscope, the laryngoscope, the opthalmoscope, the electric battery and

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the hundreds of minor appliances which Physics has laid at the feet of Medicine. Great indeed has been the harvest from this field of thought and others still richer yet await the patient investigator, whose aim is Truth.

Directly and indirectly Physics and Medicine are inseparable the one from the other. No branch of science has contributed more to the elevation of Medicine from the thraldom of empiricism, the region of elaborate investigation, none has so crowned it with the glorious rewards of well-directed research. Surely Physics has done her part.

But we have been waiting in the outer courts of the temple of life. We are to pass now within its portals, behold its inner splendors, and read the mysterious language of its laws written by Nature's unerring finger.

The realm of atoms is before us. We stand upon the *ultima thule* of physiological investigation. And when we consider that the grand results of chemistry are open only to those who can pronounce the shibboleth of earnest, honest labor, we are at no loss to explain the prevalence of metaphysiological speculation among those to whom, of all others, scientific exactness is of prime necessity. But to him whose mind has been trained in positive science, the pompous pageantry of theoretical pathology which has been paraded before the mind of the practitioner seems but the utter emptiness of a bombastic sciolism. It seems hard, indeed, to rid medicine from the incubus of hypothesis which rests upon it; but notwithstanding I do not claim to be wholly innocent of Cicero's charge, "*Suo quisque studio delectatus alterum contemnit*," for one I am free to admit that the interference of scientific dabblers in the department of zoo-chemistry, where, from the complicated nature of its processes their deception has been less liable to exposure, has greatly retarded the development of a true physiology, out of which alone a true pathology can be constructed.

Four years ago I was in attendance upon a very large medical body of great international power, where it was my fortune to hear an elaborate discussion upon the chemical

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characteristics of bone. An eminent medical gentleman of New Orleans, known to many of you, who has figured largely of late in the medical literature of the South, seemed to be the chemical oracle of the Association. Imagine the intellectual nausea with which I regarded him, as with oracular authority he wrote upon the blackboard a chemical reaction with elements in one member of the equation not contained in the other. And this to pass undetected before a body convened to represent the physiological and pathological science of the day!

But aside from all this the importance of chemistry in the elucidation of physiological and pathological problems it is needless here to discuss. It might not be amiss, however, to refer briefly to an idea that, though not now so prevalent as it has been in the history of medicine, nevertheless does much at the present day to retard the progress of physiological chemistry. The doctrine of the so-called vital principal—a relic of ancient physiological speculation which ever accepted theory for fact—names for explanations, has been thrown across the track of chemical investigation by the bold and baseless assertion that this hypothetical superior power is beyond the pale of inorganic laws—indeed, is superior to them and holds them all in check. On this account, we hear these metaphysical physicists reason, the chemical action of the agents in the organism is far different from that within the laboratory, since it meets here a higher force which holds it in abeyance or materially modifies its operation. Now what are the facts which experimental science has revealed to us anent this wonderful *supernatural* agent which sits upon the throne of life and sways the scepter of resistless power? Simply these: that this latent organism has no foundation but in the preposterous vagaries of theoretical fancy; and that the only difficulty with which the chemist meets in the application of his exact science to physiological investigation is the complicated arrangement of different elements in such immediate proximity to each other, and so intimately related as to render it almost impossible to establish the exact conditions under which his agents are to operate. In view of this it is

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clear, taken aside from a just appreciation of these relations, physiological chemistry can have no true foundation, as ever varying conditions must forever preclude the hope of establishing, apart from a knowledge of these, constant laws of chemico-physiological action.

The last stronghold into which the forces of vitalism gathered for the decisive stroke has been overthrown. With a vaunting air of triumph they challenged the chemist to an explanation of the protective resistance of the living stomach to the action of its own juices, which attack and digest a dead one subjected to their action. Taking up the gauntlet, he found that the living stomach was attacked by its juices to the extent of the destruction of its epithelium. Then coming in contact with the alkaline influence of the blood which circulates through the walls of the living stomach, its further action is neutralized, and the structure of the stomach is protected.

So perished this phantom of physiological *philosophy* by the hands of chemical science. And so will it ever be in the great battle of philosophy and science, theoretical speculation with experimental demonstration. It is but just to remark, however, that even the very exactness of chemical actions without the organism is apt to involve the physiologist and pathologist in error by the appearance of accuracy afforded by elaborately wrought out chemical formulæ by men of unquestionable scientific ability to represent structural constitency and relation. For example, we have for our reference established formulæ for the composition of the blood, gastric juice, saliva, urine, bile, and other fluids of the organism to say nothing of the solid tissues which present such variety of constituency as to throw them entirely out of the field of position and accurate analysis. These formulæ are given without one shadow of expression as to the physical or physiological condition of the organism at the time of observation. I may safely assert, that if the blood of every person in this house who, to all external appearances and internal perception is in a perfectly physiological condition, were this moment subjected to chemical analysis according to the same process, there

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would not be found two specimens to agree exactly in constitution.

To say nothing, then, of the infinite variety of constitution which might be induced by pathological conditions, themselves, we may remark by the way, never agreeing in two different persons even in the like stages of the same disease, we have here within the realm of physiology itself an insuperable obstacle to the application of exact chemical analysis to the structure of the organism. How often do we see the pages of our current medical literature crowded with analyses of blood and urine in pneumonia, meningetis, cholera, yellow-fever, &c., without one iota of reference to the physiological or pathological condition of the organism at the time of making the observation. Whatever show of plausibility these may assume, it is clear that they are of no value to the practitioner, either as regards the diagnosis of disease or the therapeutical application of remedies. *Names* of diseases have done more perhaps to mislead the profession than even the wildest speculations of physiological dreamers. So far as nosology is concerned, indeed "there's nothing in a name." What practitioner that sits before me to-day,—I care not how wide his experience,—has ever witnessed an identity of symptomatology in the same disease in different persons, or even in the same persen at different times? Even in the positive sphere of toxicology is this identity never exhibited. True it is that the administration of arsenic to two persons in apparently similar physiological conditions will produce death in both. Equally true is it that the prompt administration of the hydrated sesquioxide of iron will antidote the poison in both. But let it be marked that the *poisonous dose* to one is not the same to the other, and certain unseen conditions may exist in the one to retard the formation of the insoluble precipitate of the Arsenite of Iron in the one case that do not exist in the other.

At what conclusion do we then arrive as to the limits of chemical investigation within the organism? What are the conditions of chemical research? In the first place it is

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evident that no chemical analysis can be of value as a guide to pathological conditions, that does not at the same time consider the exact physiological relations of the organism at the time the observation is made.

Secondly. Even this observation of itself, supposing it carefully and accurately made in the full light of surrounding relations, can offer no clue to the correction of pathological conditions, but only furnishes a means of diagnosis.

If iron is wanting to the blood, here is a pathological condition which chemistry reveals,—and much has been done thereby. But what are the indications in the premises? The veriest tyro in medicine would unhesitatingly answer,—supply the iron,—nothing is easier. Just so would the little school-boy catch his bird by simply placing a little salt upon its tail. In nearly every case the very condition upon which the absence of iron depends, would also resist its assimilation when therapeutically administered, and with it unassimilated the organism would perish for the lack of it, though it drenched the whole alimentary tract. Hence these prescriptions, based upon chemical analysis of the blood, are totally valueless in the absence of those considerations which lead to the discovery of the true pathological condition upon which the revealed abnormal constituency depends.

In concluding this argument, upon which I have occupied too much time already, I would remark, with the great physiologist Lehman, that the province of chemistry in the consideration of the animal fluids and tissues is similar to that of mineralogical chemistry, for as in the one case we seek for elucidation respecting the proximate constituents of often highly complicated compound minerals and rocks, so in the other we endeavor analytically to determine the constitution of animal fluids and solid organized parts by the aid of the knowledge we have already obtained from zoo-chemistry. And, although we have in this constitution alone a mere mass of isolated facts, yet it is clear that the nature of the process by which these fluids and tissues are produced is, to a very large extent, determined by their chemical constitution.

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Having thus marked out, in a cursory manner, the scope of chemical research as applied to physiology and pathology, I beg leave to direct your particular attention to the great importance of urinary analysis. The information gained from a consideration of the constitution of the excrementitious matters eliminated from the organism is of a decidedly positive character. By this we arrive at defects in the assimilative functions of the system, the nature of which is thus clearly demonstrated. Many of these investigations are very simple and throw much light upon the diagnosis and prognosis of constitutional derangements. No practitioner is fully equipped without the means of carrying on urinary analysis. For this purpose cases have been put up to order containing all the reagents and apparatus necessary for complete qualitative analysis of the urine and other fluids. I present you herewith one of these which I regard as the most complete and convenient apparatus for such analyses that I have ever seen. It was put up for me by Messrs. Bullock & Crenshaw, of Philadelphia, and can be had for the small sum of $22 00.

Gladly would I dwell upon the details of this important branch of chemico-physiological research, but the limits of this discussion forbid me.

In conclusion, may I without rendering myself obnoxious to the charge of enthusiastic specialism, venture to predict that the introduction of *positive* scientific investigation into the realm of physiology and pathology—yes, even indeed into the more unexplored region of etiology, points to a time not far distant when the shackles of empiricism no longer shall bind us, when the avenues of life will be open, and the problem of existence solved. Heartily do I enter into the growing enthusiasm of the elder Draper, as with seer-like vision he reads the glorious future of positive medicine. I cannot, I will not believe that the great Architect of the Universe has placed any limit to human knowledge. Eagerly do I watch the grand march of scientific thought. Already the bugle-notes of investigation are heard at the very citadel of life and they tell me that there is nothing within this complex human

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organism which we cannot comprehend,—nothing which we shall not finally explain.

"In the application of exact science to physiology, I look for the rise of that great and noble practice of medicine which in a future age will rival in precision the mechanical engineering of my times." I feel well assured that the doom of empiricism is sealed. Even now we see the wonderful effects of the introduction of the scientific method, not only in the realm of physiology, but also in the hitherto nebulous regions of theology and philosophy. Here dogmatic assertions and speculative hypotheses are shown to be as utterly void of value as they were once obstructive to chemistry, and are now felt to retard the development of a true physiology. Away with that theosophic notion that there is a boundary across which scientific thought can never step,—a veil which it can never lift, behind which the arcana of life must lie concealed forever.

"The proper study of mankind is man," and when the "*Know thyself*" has been fulfilled then may we look for oracular deliverance clearer than those of Delphi, and more truthful than those of latter Rome.

I was very much impressed with the closing words of a paper sent me a few days ago by my friend, Prof. J. G. Richardson, of the University of Pennsylvania, upon his new discovery of the identity of the salivary and white blood-corpuscle, and I feel that I cannot do better than to quote them here :

"Finally, let me remark that, although some persons may be inclined to query of what benefit this item of information in regard to the salivary globules will be to practitioners of dentistry and other medical men, I have no doubt that either alone or linked with other facts, it will soon cast some light upon pathological processes in the mouth which are now more or less obscure. It is related that upon a certain occasion, some one in the presence of the celebrated Coleridge undervalued the importance of a discovery by exclaiming, "What of it? it is of no use to the world!" and that the poet justly rebuked

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this caviler by asking him, "Of what use is a new-born child?" A hundred and forty odd years ago, the same question might have been put to Augustine and Mary Washington about their infant then, as the great dramatist describes it, "mewling and puking in his nurse's arms," the new-born son of their house; and at that moment the acknowledgment must have been made that he was absolutely of no use in the world; yet if we look abroad to-day at the millions of free, happy, and industrious citizens who crowd the farms, the factories, the work shops and the commercial marts throughout the length and breadth of our Union, the answer comes to us with trumpet-tones that the man who developed from that child was, through the Providence of God, in his day and generation, the most useful that the world has ever seen.

"And so, gentlemen, it is with all the apparently useless researches of philosophers into the arcana of Nature. We can never foresee what advantage a consciousness of any particular "downright fact" will be to us in the dim and distant future; but "knowledge is *always* power," and we may be sure that every honest and faithful observation of physical phenomena which arise from those unchangeable, but infinitely various and conflicting laws that govern force and matter, will sooner or later, directly or indirectly, contribute towards extending that knowledge of man in his countless complex relations, which constitutes the proper study of all mankind."

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HÆMORRHAGIC MALARIAL FEVER

IN ALABAMA.

BY E. D. M'DANIEL, A. M., M. D., OF CAMDEN, ALA.

To designate palpable things, indifferent, arbitrary words may be used and may sufficiently subserve the simple purposes of such primitive races as are the founders of original languages. But in more complex matters, where subtile differences exist; and in which important discussions may arise, the names adopted by scientists and savans are generally derived from classical or other authoritative sources, and have an inherent significance, which rebels at the minutest misapplication, and which claims to carry in itself the germ of its own correct interpretation. Such a name is "Hæmorrhagic Malarial Fever," proposed by Dr. R. F. Michel, some years ago, and then adopted by this Association. Malarial fever must necessarily exclude all fevers not of malarial origin, and the epithet "hæmorrhagic" may include two classes of cases, viz:

1st. Such as are attended with actual hæmorrhage; and 2d, such as have merely a hæmorrhagic disposition.

Now malarial fever, say common intermittent or remittent, with accompanying epistaxis, or hæmoptysis, or hæmaturia; not essentially, but only accidentally connected, would be, in the first sense, hæmorrhagic malarial fever; that is, malarial fever with actual hæmorrhage; but it would not be the grave disease of which I am about to treat.

Again: Malarial fever, say common intermittent or remit-

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tent, attended with recognized signs of hæmorrhagic diathesis, such as purpuric, petechial, ecchymotic or scorbutic spots, but without actual hæmorrhage, would be hæmorrhagic malarial fever in the second sense; that is, malarial fever with hæmorrhagic tendency, but *it* would not be the disease that I am here to consider. *Indeed*, while not disposed to deny that a hæmorrhagic diathesis, properly so-called, may co-exist with our disease, I am not willing to admit that that diathesis is, at all, an essential or a constant part of the disease. I think that it is not, and for this I hope to show you good reason farther on in this paper.

Still again: Intense malarial fever, adynamic in type, with great increase and depravation of the gastric and intestinal mucous secretion, with constant, or at least characteristic blood-vomiting accompanying, would be another recognized form of hæmorrhagic malarial fever; the "Muco-hæmatemesic" fever of Dr. Faget, of New Orleans, and the French physicians resident in Brazil and the Guianas, but it would not be the hæmorrhagic malarial fever that is occurring in Alabama. This disease has been called by many various names, such as "Malarial Cachæmia," "Malarial Cachexia," "Malarial Hæmaturia," "Hæmorrhagic Paludal Fever," "Periodic Hæmaturia," "Intermittent Hæmaturia," "Yellow Chills," "Bloody Chills," "Country Yellow Fever," "Canebrake Fever," "Icterode Pernicious Fever," "Bilious Hæmaturic Fever," "Hæmaturic Fever," "Black Jaundice," "Malignant Jaundice," "Purpuræmia." All these varied designations cannot, of course, be critically correct, or founded on proper nosology or nomenclature; but combined or aggregated in sense, they concurrently point to three prominent things, viz:

1st. A connection with malaria, whatever this may be.

2d. An icterode discoloration of the body, sometimes only approximating, sometimes quite equalling, and sometimes even exceeding the discoloration in jaundice or that in yellow fever; and,

3d. Hæmorrhage constantly and primarily from the kidneys

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and occasionally and perhaps secondarily from other parts also.

These briefly expressed constitute "*Icterode hæmaturic malarial fever*," a significant, appropriate name, which by inversion becomes "*Malarial fever with hæmaturia and diffused icterode discoloration*," a perspicuous, precise and differential definition of that form of hæmorrhagic malarial fever which we have had since 1867, in Alabama.

With this definition rigidly adhered to, the diagnosis of the disease becomes clear, easy and certain. A case of fever, though complicated with hæmaturia and showing surfaces and tissues deeply yellow, if clearly not of malarial origin, is not a case of our disease. A case of malarial fever with hæmaturia, but without yellow discoloration more or less appreciable, is not a case of our disease. A case of malarial fever with yellow color ever so deep, but without hæmaturia, is not a case of our disease. But a case of fever undoubtedly malarial, with hæmaturia in even small quantity, and with yellow tinge only barely appreciable, is undeniably a case of icterode hæmaturic malarial fever, and can be properly nothing else.

Having now, as I conceive, explicitly stated the appropriate name and definition of the disease under consideration, and having shown both what it is not and what it is; what it excludes and what it includes, I will briefly call attention to a few historical facts which I think relate to it and bear upon the interesting and important question,—Is it a new disease?

In calling up my own reminiscences, I am sure that I have, occasionally, ever since my boyhood, seen isolated cases of what was considered intense bilious fever with the surfaces and under tissues stained deeply yellow and with the urine deep red. They were nearly all fatal, and were called in older phrase "bilious congestive," and in more recent "pernicious bilious." I have also, but more rarely, known small groups of similar cases associated; say three or four cases occurring on the same premises, or in the same family, about the same time. All such cases, in addition to the deep,

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so-called, bilious color and the red urine, had jactitation, suspirious breathing, inordinate thirst and vomiting of variously shaded and teinted, so-called, bilious matters.

By diligently inquiring, I have ascertained that very many old physicians, some of whom have now retired from practice, are satisfied that they have observed similar cases, sometimes singly and sometimes in groups.

The late lamented Dr. A. G. Mabry, in a report of a case of intermitting icterode hæmaturic malarial fever, made to this association in 1870, says, "It is a mistake to suppose that this is a new form of disease. More than twenty-five years ago, I treated, in the vicinity of Selma, cases of intermitting fever presenting, in a marked degree, all the symptoms caracteristic of these cases, at the present day."

Dr. J. C. Faget, of New Orleans, in the *New Orleans Journal of Medicine*, quotes various extracts from writings of French physicians, resident or itinerant in Madagascar, Brazil, Cayenne and the West Indies, showing that our very same Alabama variety of hæmorrhagic malarial fever had been perfectly described, defined and classified by those physicians, at a date now thirty years past, and had been named by them "Bilious Hæmaturic Fever."

Dr. R. B. Todd, in a clinical lecture, published January 19th, 1849, in the *London Medical Gazette*, says; "A state of general cachexia, such as occurs in scurvy, may bring on hæmaturia; or, such as results from an aguish state brought on by the malaria of marshy districts. Nothing is more prejudicial to hæmatosis, or the healthy elaboration of the blood, than the influence of the paludal poison."

In a work published in 1845, "On the Climate and Maladies of Brazil," M. Sigaud mentions an epidemic disease attended with the discharge of bloody urine, and for which the best treatment was found to be generous diet, with a combination of iron and quinine." A similar epidemic hæmaturia is mentioned by various authors as prevailing in the island, Mauritius.

Dr. James Copeland, of London, in his *Dictionary of*

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Practical Medicine, says: "Periodic hæmaturia is not uncommon in miasmatous climates and it is, although rarely, even seen in this country (Great Britain) among those who have been exposed to malaria or have resided long in warm climates, or suffered from periodic fevers."

Dr. Elliotson mentions a case of hæmaturia which accompanied the cold fit of ague and was cured along with the ague by the sulphate of quinine.

Dr. Charles A. Lee, in 1860, says, "In the Southern parts of our country (the United States of North America), where hæmaturia so often occurs in connection with derangements of the liver and spleen, it will often be found useful to apply leeches over these organs, which will enable us to administer tonic and astringent medicines with greater confidence and freedom.

Dr. A. J. Reese says, "We are told that in the days of Hippocrates hæmorrhagic malarial fevers were observed in the islands of Greece, sometimes accompanied with hæmatemesis (black vomit), and the hæmaturic type not unfrequent.

In Guardia's work, "Medicine through the centuries," is a quotation from Piquier, physician of Charles VI, King of Spain, who in 1758 speaks of black vomit showing itself during the paroxysms of the tertian fevers of central Spain, the disease very malignant and mortality great.

These quotations and facts demonstrate that in a rigid sense the disease was not new, when in 1867 it began to excite attention, interest and alarm, almost simultaneously in the wide-spread regions of Alabama, Mississippi, Louisiana, Arkansas and Texas. But as *as an endemo-epidemic here;* as the prevailing fever of these regions; a fever with the hæmaturia and the yellow complexion no longer as accidental or occasional complications, but as fixed regular and invariable symptoms; a fever occurring as the rule rather than the exception; it certainly was in a fair, liberal and reasonable sense, *new*. And when we consider the hoary antiquity of our venerable profession as a science as well as an art having records and scientific systems that go back to the early dates

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of literature; and when we search in vain, not only in the older classifications of disease, but also in more modern nosology, and even in the most recent and most authoritative nomenclatures, for a recognition of this malady, may we not be pardoned, if not justified in regarding the affection as a new endemo-epidemic here, and as having added a new name to the catalogue of our recognized diseases?

ÆTIOLOGY.

The affection is certainly malarial, as already asserted. I need not consume your valuable time in arguing this point, as there seems to be among the masses of our people and throughout the membership of our profession, a reasonable agreement, if not a rigid unanimity, in regard to it. The manner in which the affection simulates the hitherto ordinary malarial fevers, in being intermittent, remittent and pseudo-continued; and the obvious fact that it substitutes, or replaces, or succeeds these old well known fevers, and that it confines itself to their habitat mainly, leaves no room for reasonable doubt as to its general cause being identical with theirs or very similar to it. The honest and intelligent physician may, however, have some difficulty in comprehending why the effects of malaria appear now so different from what they used to be in the same locality. Why should those localities, which, years ago, showed the most unequivocal and extreme influences of malaria by annual autumnal visitations of congestive or pernicious intermittent, remittent and pseudo-continued malarial fevers, almost putrid in general intensity, have not, in those times, presented with considerable frequency and in considerable numbers, cases of this now justly dread scourge? And why did those same localities, soon after the earliest November frosts, become in old times as healthful, so far as fevers were concerned, as mountain tops, while the insatiate malaria of to-day relentlessly pursues its bleeding victims in mid-winter, when the air is filled with snow-flakes and the forests are hung with icicles? And why are some places once so salubrious that they knew

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no malarial fevers at all, or if any only the mildest intermittents, then popularly regarded as trivial and almost harmless, now not exempt from even this, the direst of all malarial ills—the very summation of all extreme malarial manifestations? Has not the old malaria acquired a greater intensity? or appeared in more overpowering quantity? or diffused itself to wider limits? or, if a chemical thing, undergone some allotropic change, thus becoming a modified cause and leading to correspondingly modified effects? or has a new malaria sprung into play, acquired the ascendency over the old and thus brought into prominence the new order of symptoms? or has some new morbific agent allied itself with the old malaria and lent to it additional weapons, fresh power and greater formidableness? or have the constitution and blood of our people, overpowered in war, bowed down in political despondency, unprosperous in industrial enterprises, stripped of old, accustomed, opulent surroundings, deprived of a liberally varied and nutritious diet, clad in deficiently protective livery, and forced out to greater hardships, greater labors and greater exposures, felt an intimate, profound deterioration and become unable to withstand successfully, as once they could and as once they did, the unchanged influences of our same old morbid climatic conditions? These problems demand a solution. Such questions are propounded to us by the medical events that are transpiring around us. Solemn professional duty, the expectations and the sanitary rights of society, the present interests and the future prosperity of our State, the claims of advancing science and sympathy for human suffering, all require us to consider them well and if possible to answer them correctly. I have seriously pondered this whole subject, and I am fully convinced that the grave, new order of symptoms now occuring in malarial fever in Alabama and the adjacent States, even in localities not heretofore known as specially insalubrious, is not due to any marked increase in the quantity, intensity or extension of malaria; for with the exception, perhaps, of 1867 and 1868, the average numerical manifestations of malaria have been

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fewer since the advent of the Icterode hæmorrhagic period than they were before that period set in. Nor to any allotropic or otherwise modified condition of malaria, be this chemical, or dynamical, or sporoid in its nature; nor to any marked deterioration of blood and constitution due to depression of spirit or exhaustion of body, but to a *wide-spread epidemic influence.* Nothing in medical history is more fully attested or generally admitted than the existence, in fact, of such epidemic influences or atmospheric constitutions. Their causation is so occult that they are generally regarded as ultimate facts, but their local origin can often be ascertained, their progress watched, measured and reported, their extent, duration and decline and cessation registered, their effects observed, recorded, abated, avoided or combatted. And as the smaller broods of beasts of prey—those ordinary foes of the pastoral interest, all fly in consternation to their dens in forests and mountains so soon as the advent of the lion is known, and revisit the pasture and fold no more until the last trace of his footsteps is erased and the last echo of his roar has ceased to be heard in the distance—so an epidemic influence sometimes assumes a temporary and seemingly tyrannical and absolute sovereignty and stops for the period, the visible display of other morbid causes. But this is not always the case. In the present instance the epidemic influence has not abolished malarial action; but kindred in effect, has come in as an ally to it, in the work of destruction.

GENERAL DESCRIPTION.

There are unquestionably three forms of Icterode hæmaturic malarial fever in Alabama—the intermittent, the remittent and the pseudo-continued. In the first of these the paroxysms of fever and the hæmaturia are quotidian. I have never seen a tertian or a quartan, and do not remember it, if any such case is on record. It is supposable and probable that such may exist. I have often seen the alternate days better and worse, indicating double tertian. The hæmaturia generally begins in the cold stage, and this is then often very protract-

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ed; but it sometimes appears first in the hot stage. The mere act of voiding the bloody urine is, however, distinct from the hæmorrhage, and even when the voiding takes place in the hot stage, the hæmorrhage may sometimes date back to the chill. The hæmorrhage, however, undoubtedly continues and often increases during the hot stage and disappears only when free sweating is introduced. And here let me call especial attention to the important fact, that the sweating stage is always when unassisted, imperfectly developed in all cases of all forms of this fever, and the most imperfectly in the most severe. When there is adequate and efficient diaphoresis—forming a proper sweating stage—there is generally a distinct intermission in the hæmorrhage, and when there is not the one there is not the other.

In a reasonable time, sometimes longer and sometimes shorter, after the hæmaturia is established the icterode discoloration comes on and is first visible on the conjunctiva, then on the trunk and extremities. There is from first to last, more head-ache—generally frontal—than in ordinary intermittents; and also more nausea, vomiting, jactitation, sighing, thirst and anorexia. The bowels are various, sometimes bound, sometimes free. The patient is generally rational, with tendency sometimes to depression, sometimes to elevation of the cerebral functions.

In the remittent form, the same general symptoms occur in the same succession, but with greater severity, and there is instead of an intermission in the hæmaturia, only a remission, the discharges from the bladder in the remission being less frequent, less copious, or less bloody. The sweating stage is not well developed and the fever somewhat moderated from its maximum, still distinctly persists. In the remittent, as compared with the intermittent, the jactitation, sighing, anorexia, thirst and cerebral disturbances, are greater, and the minor and less constant pyrexial symptoms are more numerous.

In the pseudo-continued form the symptoms are still more aggravated. This form may supervene as successor or sequel

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to neglected cases of either of the other two forms of hæmaturic fever, just described, or of common intermittents or remittents. I proceed to describe a case derived from common intermittent.

A person who has for months, or, may be, for years, resided in a region known to be malarious, and who has suffered frequently, if not severely, from chill and fever, is noticed to have a haggard and dull appearance, and to complain of lassitude, and to present a sallow complexion, in short to exhibit the malarial cachexia. This person, on a certain day, say Monday, at 9 o'clock, A. M., feels worse than usual, and almost thinks he has a "dumb chill". He lies down, has a scarcely distinguishable reaction and no sweating stage, worthily so-called. He would get up, but a slight fever still holds his pulse and a dull, heavy headache and backache keep him in bed. He takes no medicine, at least no quinine. On Tuesday, at 8 o'clock, A. M., a hard and prolonged chill comes on and is followed at length by high fever, great headache and backache and restlessness, all of which persist through the night, allowing no comfort and giving place to no soothing moisture on the skin. The bowels are all this time bound and the urine is as it has been perhaps for days or weeks, very feverish, of a pink color, with an odor that is allied to that of essence of beef, and with a heavy lateritious deposit, on cooling, of urates, uric acid and perhaps some oxalates.

Wednesday morning, early, there is, instead of an ordinary or proper chill, a condition more allied to collapse, or surgical shock, with many symptoms that vary, but with one that fails not—*hæmaturia*. The bloody urine is passed sometimes as often as every fifteen minutes in quantities as great as a pint, sometimes less frequently and less copiously. But in a case of the kind that I am now describing, after the first discharge of bloody urine, *there is no more obvious periodicity:* there is either a protracted condition of dubious hesitation between collapse and reaction, or there is a continued reaction—traumatic, symptomatic or hæmorrhagic, but hardly to be

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admitted as a fever in any idiopathic sense. There is an inquisitive, quick, searching eye, great oppression of breathing, deep and frequent sighing, extreme uninterrupted nausea, vomiting of variously bilious-colored matters, but not often, if ever, of blood, unquenchable thirst, great sense of heat, uncontrollable restlessness, and extreme anxiety. The skin has sometimes a cold moist cadaverous feeling from relaxation and consequent watery transudation, but it has no proper perspiration; sometimes it is hot, and it *always*, but with varying rapidity and at periods of the disease not always the same, *assumes a deep icterode hue*, which may even reach the darkness of bronze. The lips, nails, all the tissues, exhibit the yellow stain and the discharges from the stomach and bowels as well as the saliva and the passive cutaneous transudation, when they touch the clothes and bedding impart to these the same tenacious color. The tongue is flabby, moist, at first pale then yellow, and finally, if the hæmorrhage persists and a fatal termination impends, becomes dry and covered with black sordes. The bowels are now extreme, either constipated or diffluent, and if discharging, the dejections are apt to be watery, copious, deeply yellow, or intensely green, sometimes almost black, rarely, if ever, bloody.

I have intimated that this disease *generally* succeeds the old, well-known, common and milder forms of malarial fever, or cases of malarial cachexia; I must add, *not always*. I have witnessed cases, and have heard of others, in subjects who showed no cachectic appearances; who had no enlargement of the spleen; who had not suffered repeated attacks of malarial fever; indeed, who up to the time of seizure, appeared to be in good health,—but they all had been sadly exposed to malaria and were no doubt surcharged with it.

The disease assails both sexes of the white race, about according to exposure,—it attacks the mulatto, and also the full-blooded negro, but this last, rarely. In some localities the seizures, in any given year, do not reach one per cent. of the inhabitants; while in other places a family of ten may have five cases during one season, or fifty per cent. of seizures.

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In 1871, in the town of Camden, within the corporate limits, there were only four cases in a population of eight hundred; and of these four cases only one proved fatal. This would give the ratio of seizures to population one half of one per cent., of mortality to seizures twenty-five per cent., and of mortality to population one eighth of one per cent. Throughout the State of Alabama, I am satisfied that the seizures are much less than one half of one per cent. of the population, and I am also satisfied that the rate of mortality, the State over, ought not, under proper treatment, to be more than fifteen or twenty per cent. of the seizures. Do the people of Alabama know how much they owe that profession whose indefatigable labors have already reduced the death-rate of this disease from fifty per cent. to twenty per cent. or under?

To prepare you to appreciate the better what I believe to be the pathology of the disease, I beg to mention some well-known affections to which the one we are considering has a very undeniable analogy,—to which it bears the nearest affinity, and with which in pathology it seems to me congeneric. Among these are the hæmorrhoids of malarious districts—the bloody dysenteries and the, so-called, bilious pneumonias of hot humid countries, Purpura, Scurvy, Renal Hæmorrhage from Catarrh, Scarlet fever, Gout, and Rheumatic fever.

Now, you all know so well that the first three of these diseases obviously relate themselves to our fever, by abounding most conspicuously in the most malarious countries, by often assuming the periodic characteristic and by presenting hæmorrhages, the first from the loops of the hæmorrhoidal vessels; the second from the vessels of the rectum and colon higher up; and the third from the pulmonary circulation, that the strong general analogy need not be pressed upon you. Purpura and Scurvy, also have their points of similitude to our disease, but I cannot and I need not stop here to mark these points. But in Rheumatic fever—in acute catarrhal renal hæmorrhage and in scarlatinal hæmaturia, although the outside resemblance is so palpable that it cannot

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be overlooked, the intimate conditions and actions are even more closely allied. The very same organs, to wit: the kidneys, are in all these cases, the seat of the prominent trouble—the prominent trouble is itself, in all, the same, to wit: hæmorrhage—and the cause of the trouble, is, in all, directly due to the same antecedent condition, viz: interrupted cutaneous action, so that one might hesitate to call the pathology in the different instances merely allied, or analogous, or homologous, or congeneric, or cognate, and might insist that it is identical. And therefore, all the known facts and established principles in the received pathology of Rheumatic, of Catarrhal and of Scarlatinal hæmaturia, apply also to that of Malarial hæmaturia and become so many invaluable resources in determining the rational treatment of the last-named affection. I cannot, otherwise, more tersely or graphically present these facts and principles, or invest them with higher dignity and greater authority, than by quoting at some length, the language used by the distinguished R. B. Todd, in a clinical lecture delivered in his hospital service more than twenty-five years ago:

"Wm. Barrows, aged 23, was admitted on the 2d of June, laboring under Rheumatic fever, and he is now, 13th June, suffering under that disease, accompanied with severe pericarditis. Almost from the commencement of the Rheumatic symptoms *he had passed blood in his urine* and when he was admitted, his urine contained lithates in large quantity in addition to the blood. The hæmorrhage is gradually getting less, but not until the amount of blood lost has been very great. * * * Now what can be the cause of the hæmorrhage in this instance? It is common to find in the course of certain diseases dependent on the presence of morbid matters in the blood, more or less irritation of the glands through which the morbid matter is eliminated. The glands especially concerned in the elimination of the poison of Rheumatic fever are the kidneys, and in the present case the irritation has been extreme. As a result of it a great afflux of blood to these organs takes place and, if this engorgement attains a

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certain intensity, the delicate vessels of the Malphigian bodies give way and the blood escapes. Now we have many cases to prove that hæmaturia may be caused by irritation of the kidneys excited by a substance which can reach the gland only through the blood.

It is well known that turpentine and cantharides will both irritate the kidneys when administered in large doses. Cantharides in small doses excites the kidneys and increases the secretion of urine, but the excessive excitement produced by large doses, diminishes the flow of urine, the state of engorgement being too great to be compatible with the healthy functions of the organ, finally the vessels yield and hæmorrhage is the result. The effect of turpentine is the same. In the present case lithic acid was the principal irritating agent, as was shown by the great abundance of lithates with which the urine was loaded. Sometimes oxalate of lime is formed and is discharged with the lithates as in the present case. Now oxalate of lime is a very irritating substance, and thus in the present case, there were probably two sources of irritation, the lithic acid and the oxalate of lime."

Now for the Doctor's treatment of this interesting case:

"The principal indication, in a case of this sort, is to promote active elimination by other emunctories besides the kidneys, and so to relieve these organs as much as possible. Thus it will be necessary to excite the action of the skin by diaphoretics, of the bowels by purgatives. Counter-irritation over the region of the kidneys may also be employed advantageously, or if the patient is robust a small cupping may be of use, but the strength of the patient and the amount of the hæmorrhage should always be taken into account prior to the application of this remedy. In this case we would not be justified in taking away blood, the patient being already greatly anæmiated. * * * If you have recourse to counter-irritation you must be careful to employ mustard and to avoid turpentine and cantharides, the active principles of which, even when they are applied to the skin, are readily absorbed

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and may exercise a pernicious influence on the urinary organs."

The next case is one of catarrhal hæmaturia.

"J. Pickford, aged 40, laborer, was admitted into the hospital on the 15th of May. His habits have been temperate, but he seems to have been getting into a bad state of health for sometime past, as he had abscesses in his axilla and elsewhere a fortnight before his admission. Soon after these appeared, œdema came on, first in his feet, but very soon after in his upper extremities and face; finally the effusion took place in the scrotum and abdomen, and when he entered the hospital he was universally dropsical. One of his most prominent symptoms was scantiness of the urine, which did not amount to more than from three to four ounces in 24 hours, of specific gravity 1020, *very bloody* and nearly solidified by the addition of nitric acid. So small was the quantity that for two or three days I feared there might be a total suppression of the secretion. However, on the 17th the quantity began to increase and continued to do so. Throughout this period it contained blood-corpuscles in great numbers; it was free from chrystals of any kind, but contained a great number of fibrinous casts and renal epithelia, which left no doubt as to the blood having its source in the kidneys.

The state of the kidneys in this case was probably owing to exposure to cold, but the attack cannot be traced to any particular instance of exposure. Cold, however, is the most common cause of this state of the kidney, particularly if accompanied with a sudden suppression of sweat. Under these circumstances some morbid material is retained in the blood in undue quantity, which irritates those organs through which it is eliminated, in a manner similar to that in which the morbid matter or poison of Rheumatic fever is eliminated. In this way an irritated and inflamed state of the kidney is induced, which sometimes terminates in destructive disease of the organ.

The indications for treatment afforded by a case of this kind are very obvious. They are to restore the defective ac-

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tion of the skin, to soothe and relieve the irritation of the kidney, and to promote the elimination of water from the system.

We have in the hot-air bath a very valuable and ready means of exciting the action of the skin. After the hot-air bath has been frequently used, it produces a state of great debility, and this constitutes the chief difficulty in continuing it so as to obtain the greatest benefit from it. In this instance I carried into effect the Russian practice of dashing the patient with cold water immediately after he came out of the bath. The effect in this, as in other cases in which I have tried the plan, was certainly to give the patient a greater tolerance of the remedy, and at the same time, by the reaction which succeeded the cold dash, to cause more active sweating on his return to bed.

With the hope of relieving the active congestion of the kidney, our patient was cupped over the left loin and several ounces of blood were taken away. I cannot say that he derived any benefit from this, and I must confess that in the treatment of similar cases, I have been more frequently disappointed than satisfied by topical blood-letting when the congestion of the kidney was active. As long as the morbid matter is undergoing elimination through the kidney and keeping up irritation of the gland, local blood-letting does little or no good. If a particle of dust gets into the eye, it excites conjunctival inflammation; you may leech the eye day after day until your patient is blanched, yet active congestion of the conjunctiva will continue; but remove the particle of dust and the congestion will quickly subside. So with the kidney; you will do more to remove the active congestion of which it is the seat, by opening new channels for the elimination of morbid matter, restoring and promoting the action of the skin and increasing that of the bowels, than by the withdrawal of blood."

"The third case is that of a boy named James Taylor, who is laboring under dropsy after scarlet fever. I call your attention to it *now*, merely because it affords another instance in

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which irritation of the kidneys from the presence of a poison in the circulation, some of which is being eliminated through the gland, gives rise to *renal congestion and hæmorrhage*, and causes albumen to appear in the urine after scarlet fever, even after the red particles of the blood have ceased to show themselves in it. We now and then find it produced in scarlet fever in the early stage, even when the eruption is well out, but in general it does not appear until the desquamative stage; that is, whilst the poison is passing out of the system. It is interesting to notice, that the cases in which the eruption has been trifling and has not come out freely, are those in which the kidney is most apt to be affected; the work of elimination being thrown chiefly upon the kidney and very little on the skin. Often the patient may have got well through the fever and may have had a good convalesence; he goes out; is exposed to cold, and the next day dropsy appears, bringing in its train all the other symptoms of renal congestion."

Now, Fellows of the Alabama State Medical Association, I fear that I may have tired you by the necessary length of these extracts, but I am convinced that the ultimate effect of making them will be to economize your patience and your time. They delineate the pathology of Rheumatic fever, and account for the hæmaturia that often connects itself therewith, and they give the rational indications that should guide us in the treatment of that fever, and its accompanying hæmorrhage. They do the same, for catarrhal hæmaturia and scarlatinal hæmaturia. The pathological delineation of gout would take the same outline, size and color in which those of Rheumatic fever, of acute catarrhal dropsy, and of scarlatinal dropsy with their hæmaturic complications are represented; and the very same picture would portray to life the blood-conditions, the cutaneous, the gastro-intestinal and nephritic troubles that are of malarial origin. Indeed, the identical chemical sediments which are rigidly known to compose the urinary deposits of rheumatism and gout, are those which also constitute the

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familiar lateritious deposits that fall from the urine of victims of chronic intermittents.

Perhaps some one may ask, Why lay so much emphasis upon the hæmaturia and, relatively, so little upon the other symptoms?

My answer is, that the hæmaturia, while it is the most dangerous and the most difficult to treat, has been the least understood and the least appreciated, practically. Some eminent physicians among you tell me that they, in treatment, pay no attention whatever to the symptoms; and others, that they look upon the bloody discharge as salutary, as an effort of nature to throw off disease, and therefore not be checked but rather to be encouraged. On the contrary, I regard the hæmaturia as no more an effort of nature—no more salutary—no more to be allowed or encouraged than would be the bleeding from any surgical wound. It originates in a structural injury of the kidney. The nausea—the vomiting—the morbid gastro-intestinal products are, in large part, though not altogether, referable to this injury of the kidney, and would result if an equal injury of the same organ were the effect of a wound. Dr. Warren Stone—the late eminent surgeon of New Orleans—clearly pointed out the co-existence and connection of such gastric conditions and symptoms with severe surgical injuries, and taught our profession how to treat them by the use of calomel and bicarbonate of soda. The same conditions and symptoms may arise, as in the cases we are considering, from the shock of sudden injuries that are not strictly surgical, and may be successfully treated by the same excellent remedies.

PROPHYLAXIS.

The prevention of the disease must be attempted by sedulously keeping up the activity of the skin and the regular performance of the digestive functions, as well as by permanently arresting any existing febrile paroxysms. Habitual hot baths should be employed; protective clothing worn; sudden and prolonged exposure to cold and dampness avoided;

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night air and insolation equally shunned; fresh and nutritious diet provided; pleasant exercise kept up; quinine, iron, arsenic, iodine and other tonics judiciously and freely used; and most important of all, by far, a quiet home adopted in a locality where, as far as possible, the water is free from unwholesome impurity and the air from malaria. The premises and immediate surroundings should be kept scrupulously clean, effective drainage secured by ditches when required, and adjacent cultivated grounds should not be planted in cotton or other plants that densely shade the soil and draw little moisture from it, but in corn or other similar crops that may rapidly abstract excessive water from the earth and transmit it to the air.

TREATMENT.

In the treatment the indications are,—

First. To stay the hæmorrhage.

Second. To correct the derangements of the digestive function.

Third. To prevent additional paroxysms.

Fourth. To soothe the injured organs and to make suitable restitution for the blood that has been lost.

These indications are to be met as follows:—

First. Take about grs. xv of Calomel and grs. xv of Bi-Carbonate of Soda, mix them well and divide into vi equal powders, of which give one dry on the tongue, to be swallowed with a mouthful of cold water; give these powders continuously, one every two hours, until the constipation is overcomed or the diarrhœa corrected. If any one of the powders is thrown back or believed to be thrown back by vomiting, let no time be lost, but another immediately given, and so on, until the vomiting is palliated (and this will generally not be long) and let the insatiable thirst, in the meanwhile, be indulged with pellets of ice, if this can be had.

Second. Apply heat to the general cutaneous surface, either by the hot-air bath, or by the hot-vapor bath, or by surrounding the patient with hot irons, hot bricks, bottles of hot water, bags of hot salt, or otherwise as most eligible under the cir-

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cumstances. A cataplasm of mustard should also be applied to the abdomen and should extend high up on the chest so as to relieve the oppressed respiration as well as the nausea. The mustard should by no means be allowed to blister, but merely to redden. The feet and legs should be placed in a tub of strong mustard-water as hot as can be borne and should be kept in this bath as long as can be borne, without decided fatigue. Not the least heated air or heated vapor should be allowed to be inhaled, but the face of the patient should be industriously fanned and wiped with ice or, in the absence of ice, with the coldest available fresh water. The cold wiping should be done rapidly and perseveringly but interruptedly, as by this method, its effect, which is exerted by stimulating reflex nerve-action,—both local and general, both excito-motor and excito-vasor—and also by soothing and moderating the excessive and oppressive sensation of heat, may be most steadily and lastingly kept up. In this way the application of heat to the general surface may be almost indefinitely prolonged and its brilliantly salutary effects—directly in restoring the skin functions, and indirectly in arresting the hæmorrhage,—will become promptly and conspicuously manifest. The sighing will cease; the nausea and vomiting will disappear; the jactitation and anxiety will subside, and the utterance of the patient instead of the despondent murmur, "Oh, I feel so bad," will be the greatful and hopeful admission, "I now feel better." But if, as will *exceptionally* happen, and that too when the surface of the body is pale, cold and collapsed,—a condition of surface not at all incompatible, but on the other hand, often associated with a subjective sensation of most intolerable morbid heat,—the hot applications can absolutely not be borne and should seem to augment the excessive existing debility and oppression, then they should be alternated by the cold Russian dash, or replaced by the use of ice or cold water all over the body, according to the method already advised for the face. Now, I know that there are many honest and very intelligent physicians who regard heat simply as an invariable stimulant and cold as necessarily an absolute sedative, and who will be

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at a loss to understand how two modes of treatment that are, superficially considered, so opposite as the two here designated, can be rationally consistent and both practically safe and successful. I may remind such that in a general sense, extremes may meet, and that the morbid effects of excessive heat and of excessive cold, as exhibited respectively in burns and in frost-bites, are strikingly similar. And so in the therapeutical applications here advised, the heat and the cold ultimately reach the same curative result: the heat directly stimulates the cutaneous nerves and capillaries and thus mainly acts in restoring to the skin the lost powers and functions of its nerves and exhalents: the cold imparts a shock—not one that is depressing but stimulating; one that excites reflex nerve action and thus re-establishes vascular and secretory functions that have been suspended. The fact that cold applied as here advised, is truly, really and practically a stimulant is beyond all question. A bladder of pounded ice will in these fevers, often produce the redness of a rosebud on a surface on which a sinapism will excite neither color nor sensation. I have, occasionally, merely by spring-water at 60° Fah. temporarily removed the icterode hue from the skin and revived temporarily the weakened capillary action. And that cold thus applied is not only a remedy occasionally allowable, but a well-established invaluable, heroic treatment in the congestive fevers of the tropics and of sub-tropical climates, and even in the congestive stage of such fevers, is a matter of accredited medical history, and is taught by Currie, Warren Stone, and so many other great masters of medicine, that it may be regarded as a canon in our medical creed.

That the restoration of cutaneous action, and especially of the perspiratory function, and the use of proper medicines of the purgative class, are the rational and appropriate remedies for the hæmorrhage, which is the great and imminent danger in hæmaturic malarial fever, must, I think, be obvious from the pathology of the disease upon which I have insisted.

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That they are the remedies which are sanctioned by practical results is equally clear.

Dr. J. C. Osborne, of Greensboro, Ala., doubly taught by observation and by experience, states that the warm bath gave more comfort and quiet than any other remedy. This testimony dates as far back as 1867. In the same year Dr. East, of Grimes county, Texas, treated cases of the disease and afterwards published a paper in the *Galveston Medical Journal*, from which are taken the following extracts:

"I found the patient complaining of frequent chilliness, a hard, frequent jerking, though not full pulse, frequent discharges of bloody urine, with griping pain in the bowels; skin yellow, rough and dry. The tongue red on the margins and coated with a yellow fur in the middle, bitter taste, conjunctiva deeply stained and vision clouded. The patient complained of epigastric uneasiness, spirits much depressed, languor and nervousness. There was a general discoloration of the skin attended with smarting and itching. Bowels constipated.

℞. Mild Chloride Mercury.....grs. x.
Sacchar. alb..... " xx.

Make powders No. iij; ordered one every three hours; also, a saturated solution of Epsom salts, teaspoonfull every three hours; ordered, also, a hot pepper and mustard foot bath under cover.

On visiting the patient the next day, I found him quiet—had had three good discharges from the calomel and salts; free from fever; and had discharged no bloody urine since midnight. Ordered quinine, grs. iv, Dover's powder, grs ij, every four hours, and also a teaspoonfull of the salts solution every four hours, making a dose of one or the other every two hours.

Was called to the patient again at 6 P. M. Symptoms all aggravated; began to get worse after the third dose of quinine and Dover's powder. Intense cephalalgia; suffusion of the eyes; debility; listlessness; dull countenance; discharging bloody urine every half hour; a most painful and persistent aching of the back; tongue loaded with a yellow

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fur and breath very offensive. Ordered a hot salt and mustard foot bath under cover, and directed Gelsemin, gr. ss, spirits Nit. Æther, f. dr. j, every three hours in water.

Next morning found patient better, passed no bloody urine after the second dose of Gelsemin and nitre. Ordered the foot bath at night for two or three nights, and the Gelsemin and nitre to be kept up at intervals of four hours for two or three days, with a tablespoonfull of the salts solution every morning. Ordered also a little egg-nog. Patient revived."

Dr. East states that this same patient—John Stevens—had a little more than one year afterwards, another attack of the same kind, in which substantially the same treatment was employed, with like happy effects from the purgatives and the hot applications, and the same deplorable symptoms rapidly following the use of quinine. He also states that about the same time he had three other kindred cases, and treated them similarly with similar results.

In a most valuable letter, kindly addressed to me by my highly esteemed friend, Dr. A. J. Reese, and dated Mobile, Ala., April 2d, 1874, the author says: "I have concluded to write you a few lines on the subject of your essay, and particularly, to call your attention to the plan of treatment which I found successful in Dallas county, in 1867, and subsequently. It is not my purpose to review the practice of any, but only to give the plan of treatment adopted by myself with almost universal success.

First: A dose of calomel is given to commence its work of disgorging the mucous surfaces, removing the vitiated matter and assisting the liver to resume its functions so soon as reaction takes place. To produce this result—reaction—to restore an equilibrium in the circulation, and to force the skin to assist the overburdened kidneys in performing double duty, I employ heat (one of Tyndall's modes of motion). For this purpose a hot-air bath, with patient well covered with blankets until there is free diaphoresis (the patient breathing pure air as much as possible in the meantime). When this point has been attained, and the vomiting ceases, the patient's thirst may

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be gratified with cold lemonade which may be given as rapidly as absorbed. In the absence of lemons I have used chlorate of potash as an oxygenating agent. Should the artificial heat require assistance to stimulate the capillaries, atropine, alone or combined with morphine, hypodermically, should be added. The hæmaturia ceases usually soon after reaction takes place and there is free diaphoresis."

The same in tenor is the testimony of Dr. Robertson, of Birmingham, Ala., who says that he has had the greatest success by wrapping up his patients in blankets wrung out of hot water and thus promoting perspiration.

Dr. J. Paul Jones, of Camden, Ala., tells me that about three years ago, he was sent for many miles to see a youth who was suffering from this pernicious form of fever, and found the patient in a state of very considerable collapse. Being without any fixed opinions on either the pathology or treatment of such cases, he addressed himself to the relief of what seemed to him the most urgent symptom, namely, the collapse. He plied his patient with heat, by bricks, bottles, and poultices and the like, covered him with blankets and quilts, succeeded in getting reaction, and found that the hæmorrhage ceased and with it all the other very urgent symptoms. He has ever since, uniformly adopted the same course of treatment in similar cases, and I know that he has inaugurated in his practice in such cases, a new era of most gratifying success.

Before I pass from this head of the treatment, I think it important to call your attention to some substitutes for calomel and soda, that seem to me worthy of careful trial with the view of correcting the conditions of the stomach, liver and bowels. Powdered epicac, one or two grains, may be substituted for the two and a half grains soda with the calomel in the prescription above recommended; ipecac may also be used in place of the calomel, and linked with the soda for the same purpose; podophyllin has been highly recommended in small and repeated doses instead of the calomel, but I cannot guarantee that it is equally efficacious. I think it

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likely, on theoretical grounds, that the carbonate of lithia—so efficient in lithic varieties of urinary deposits—would be better, associated with the calomel, than is the soda. It deserves a trial here as well as in the prophylaxis to correct that condition of the blood and urine which leads to the nephritic lesion.

I also mention, in passing, that if you expect any benefit in this hæmaturia, from substances known to do good in the proper hæmorrhagic diathesis—such as alum, gallic acid, tannin, acetate of lead, and persulphate and perchloride of iron,—your expectations will be disappointed, and for the reason that there is not here a change of blood characterized by reduced fibrin and diminished coagulability, or by things abstracted; but on the other hand, a change dependent on things superadded, excrementitious matters being retained and constituting blood poisons and kidney irritants. The only hæmostatic adjuvants worth one moment's consideration here, are arsenic, Mur. tinc. of iron and hypodermic injections of fluid extract of Ergot. I think well of these skillfully used. The arsenic, however, should never be given in the acute stage of the disease, in the nauseating form of Fowler's solution, but in powder with some demulcent substance like powdered liquorice. The Mur. tinc. iron cannot be given and retained until the condition of the stomach has been improved, and then it will be found that the hæmorrhage has also, already ceased. These adjuvants will be rarely demanded.

3d. I now proceed to the third indication of treatment—the prevention of additional paroxysms. This is an easy task, if the previous indications have been successfully and efficiently met. The wonderful general impression made by our disease; the stunning shock to the nervous system; the fearful loss of blood; the grave, traumatic-like lesion inflicted on the kidney, and the other sudden great changes every where apparent, seem, temporarily, to break the morbid habit and to interfere, for a while, with the periodic tendency. If the gastric, intestinal and cutaneous functions be continually watched and properly sustained, I believe that the immediate demand for

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specific antiperiodics will be, by no means, great or imperative, and if, in any way temporarily contra-indicated, their use may be, for a while, justifiably postponed. Now, my professional brethren, I know that I here step upon awful, solemn, dangerous and responsible ground; and being, in general, as you all know, an advocate of quinine to an extent that few prudent men can claim to exceed, I take the position that I do here, not without having made the proper, thoughtful, serious and conscientious pause. In Dr. East's experience, as far as I read it to you, and in much more that I did not read to you, just as often as he got his patients into a satifactory condition and then commenced giving quinine, just so often *he plunged them back into hæmaturia*, with its unnumbered woes and dangers. And often, in conversations on this subject with physicians and others, I have had my attention called to cases in which hæmaturia followed quinine, apparently as effect does cause. And over and over, and over again, have I in my own practice observed the hæmaturia re-established or aggravated after quinine; and on the other hand, have seen the disease, with a very formidable array of symptoms, go handsomely on, without one grain of quinine, to a happy convalescence. Dr. A. J. Reese, in the letter already quoted, says on this point: "I wish to add, in conclusion, that quinine given in the congestive stage will hasten the hæmaturia. My attention was called to this fact in the first two cases I treated—males, ages respectively 26 and 45—the hæmaturia commencing in each a few hours after taking large doses of quinine—the discharges from the kidneys very copious. These two cases, together with all treated subsequently, were treated according to above plan—quinine withheld until the emunctories had resumed their work and hæmorrhagic action ceased."

Having placed before you this array of strong, indubitable and important facts, allow me to counsel you to farther and closer observation, and declining any advice as to whether or not you should give quinine in the bleeding stage of such cases, or very soon thereafter, to leave you entirely, for the present, to your own responsible judgment and discretion.

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Where quinine produces obstinate emesis, it should not be given, by the mouth at least, and emetics, if used at all, must be used with great caution throughout the treatment of the disease. The obvious effect of vomiting, and of all other straining efforts, is to augment the hæmorrhage. But powdered white arsenic, 1-12 gr., with powdered liquorice root, ½ grain, is not nauseous, and being antiseptic, hæmostatic and febrifuge, should not be omitted. It may be given every 4 or 6 hours.

4th. The fourth and last indication is to soothe the injured organs, and to replenish with blood the depleted vessels.

The kidneys should be sedulously guarded and protected from continued or additional irritation. Rest in the recumbent position must be secured; no irritating diuretic substances, such as cantharides, turpentine, or santonine, should be employed, either externally or internally; the urates must be antagonized by the use of the salts of lethia; demulcents and demulcent kidney-tonics, such as flax-seed tea with fluid extract of buchu, may be combined with grateful, sweet spirits of nitre, and harmless diluents should be reasonably indulged. The stomach and bowels, irritated and tender, must be allowed repose; no solid food must be permitted, but the diet must be rigidly restricted to fluid or semi-fluid forms of light, bland and grateful aliments, until the digestive powers become gradually restored. Sweet milk alone, or with corn meal mush, if properly relished, will be excellent food. But in cases where the hæmorrhage has been completely exhaustive, where the patient is constantly on the verge of deliquium, as where the least elevation of the head, or the least effort at self-movement, convulses his limbs with tremors, or veils his vision with darkness, or seals his pale lips in muteness, no hesitation should be allowed or time lost, but prompt recourse should be had to mediate or immediate transfusion. If human blood be not available, that of lambs or of calves may be defibrinated and used, or, preferably to these, fresh cow's milk may be employed.

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PUERPERAL ECLAMPSIA.

CHLOROFORM.—FORCEPS.—POST-PARTUM HÆMORRHAGE.

BY F. M. PETERSON, M. D.

At 8 o'clock, P. M., Nov. 5th, 1873, I was summoned in haste to Amelia H. (col'd), primipara, aged about 17 years. She was attacked at 1 o'clock, A. M., with violent vomiting, without any premonitory trouble of any kind, and the attacks occured at short intervals during the day.

At 6 o'clock, A. M., uterine contractions commenced, and at 12 o'clock, M., the pains became severe, and soon after "bearing down," and at 3 o'clock she gave birth to a living male child, weighing about eight pounds.

According to the statement of the *sage femme* in attendance (an old colored woman of more than average intelligence), the patient seemed to be doing very well after the birth of the child—looked at it, and appeared quite cheerful and natural until she informed her "that there was another one to come". This announcement shocked her very much, and she immediately seemed greatly depressed, so much so, that she regretted that she had informed her of the presence of another child in the womb, and attributed all of her subsequent troubles to this cause. The labor which commenced in fifteen minutes after the birth of the first child, for the expulsion of the second, now became almost entirely suspended, and she became restless, and began to throw herself about and talk incoherently.

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About this time she had a violent convulsive seizure (*five o'clock, p. m.*). Consciousness partially returned after half an hour, but she could not be induced to make any effort to get through with her labor. A second convulsion occurred at 7 o'clock, P. M., and the friends of the patient and the midwife thought she was dying. I found her very much excited, and with constant jactitation, but sufficiently intelligent to apprehend what was said to her. She recognized me and begged that I would do all I could for her. There were great apparent anxiety about her condition and gloomy forebodings as to the result, notwithstanding my presence, and the confident assurance of her friends that she would soon be relieved.

Pulse 110; temperature about 103°; respiration 28; skin dry; head hot; thirst *insatiable*, with frequent vomiting spells. The attacks of vomiting had occurred so frequently that the midwife had thought it advisable to restrict the quantity of water to a very small allowance, only enough to moisten the mouth and throat. The bowels had not acted since the day before, and the bladder had not been evacuated since 12, M.

Vaginal examination. Vulva and vagina hot, dry and tender; the bag of waters of the second child collecting and opening the os uteri.

The presentation could not be determined, as no part of the fœtus could be touched. After waiting for two or three pains to bring the presenting part within reach and with no result, and finding the contractions feeble and inefficient, the membranes were ruptured and a large quantity of *liquor amnii* escaped, apparently as much as is common in single pregnancies at full term. The presentation and position were now determined,—

Vertex, presentation, position, R. O. P.

The first contraction after the evacuation of the *liquor amnii*, forced the head down into the pelvic excavation, and the occiput rotated *into the hollow of the sacrum.*

At the next pain the patient had a violent convulsion, lasting about five minutes, in which every muscle in the body seemed to be involved. As the convulsive movements passed

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off, and respiration became established, she became quiet and seemed to be in a stupor, until the next contraction ensued. She now attempted to get out of bed, and was with difficulty restrained. Maniacal excitement followed. She screamed, *bellowed*, kicked, threw her hands about, *rolled over*, drew her feet under her, and threw the abdomen *up*, so that I felt quite sure the fœtus would be killed. The fœtal heart could be distinctly heard above the iliac fossa of the right side, before the rupture of the membranes.

During this attack a messenger was dispatched for my obstetrical instruments, and for my son, Dr. J. J. Peterson. The Doctor arrived at 9½ o'clock, one hour and a half after my first visit. *Two* convulsions had occurred, notwithstanding the use of the cold douche to the head, and chloroform by inhalation. It is proper to state, however, that the quantity of chloroform used was *only half an ounce*, this being all I could command until the arrival of my son. The labor had made but little progress since the rotation of the occiput of the fœtus into the sacral cavity, and the *wildest delirium* was still present, and it was deemed best to attempt the immediate delivery of the patient by the use of the forceps, as there was no prospect of a speedy termination of the labor *per vias naturales*.

Chloroform was now used freely, with a view of getting her profoundly anæsthetized. More than an ounce was inhaled before any apparent effect was produced, but finally she *suddenly* became quiet, and was soon in a condition to operate. The forceps were now applied and a living female child was delivered without any great difficulty. This child weighed about seven pounds.

A very *large* double placenta was soon after removed, and the *greatest* care exercised to secure proper uterine contractions. But, notwithstanding these efforts,—both hands being applied over the fundus uteri, and the *whole* abdomen *kept well grasped and contracted*—the uterus rapidly expanded and filled with blood, and in a few minutes the fundus reached nearly to the ensiform cartilage. An alarming concealed hæmor-

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rhage occurred despite the constant and judicious efforts to secure and maintain *firm* uterine contractions—most carefully and conscientiously performed by my son, Dr. J. J. Peterson. The hand was introduced, and the coagula removed, and firm pressure made over the organ, and very cold occidulated water was freely applied to the hypogastrium and vulva, and a large dose of ergot administered. In spite of all of our exertions the uterus several times expanded and filled with blood, but nothing like the first described. The quantity of blood lost was *enormous*. The pulse became exceedingly feeble, and at times quite imperceptible, the extremities cool, requiring the application of sinapisms, and the liberal administration of brandy.

At the expiration of one hour and a half from the delivery, the hæmorrhage had ceased, but still there was imperfect uterine contraction, and it was found necessary to maintain it by *cold*, *ergot* and *careful* manipulation. Under a full dose of opium and valerian the patient became quiet, but the arms still remained firmly flexed, and could not be straightened. In about thirty minutes she became tremulous, as if affected with cold, and was soon seized with a *terrific convulsion*—biting the tongue severely and with hissing respiration, &c. All of the muscles of relation were involved, and indeed every muscle in the body *seemed* to be more or less so. As the convulsive movements passed off, the *maniacal* delirium returned, and for more than an hour it required the whole strength of one powerful man and two women to keep her in bed. Great apprehension was felt lest she should have a fatal loss of blood, but although from her great exertion, the radial pulse was almost extinct, there was fortunately very little hæmorrhagic effusion. The muscular contractions extended *even to the uterus*. After becoming exhausted, she fell into a stupor, but continued to toss the head about, and the arms remained rigid with tonic contraction. Bromide of potassium, half a dram, with elixir of opium, mxxx, was now given, and the patient left, with instructions to repeat the dose in one hour if not perfectly quiet. This was at 1:30 A. M., five and a half

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hours after my first visit. At 4 o'clock A. M. I was re-called to my patient,—her mother and the midwife representing that she had had six convulsions, meanwhile, notwithstanding the faithful administration of the medicines prescribed, with cold applications to the head, &c. I now used chloroform by inhalation until the excitement and delirium were controlled, and she became perfectly quiet. The anæsthesia was maintained until 7:30 A. M., when I again left her. At 10:30 A. M. I found my patient perfectly quiet but had had several *fits of excitement*, in which it was found necessary to hold her in bed,—but no convulsions. The attacks were growing more mild and continued for a much shorter time. Pulse 120, small and feeble; temperature 101°; respiration 22. Catheter introduced and *three pints* of turbid urine drawn off. (At my first examination I found the bladder *empty, or nearly so*, and there was no fecal accumulation in the rectum.) This urine was carefully and repeatedly tested for *albumen*, but not a trace of it was found. A specimen of this urine was sent to T. O. Summers, Professor of Chemistry in the Southern University, who made a qualitative analysis, with the following result:

"*Qualitative Analysis of Urine sent by Dr. F. W. Peterson from Puerperal patient.*

Sp. gr. 1012..

Reaction —, acid.

Deficient in *urates* and *phosphates*.

Abundant in oil globules and *emulsified* fat, characterizing it as *chylous* urine.

Abundant in epithelial cells.

A few pus corpuscles.

A few blood corpuscles (red).

No *albumen*—no sugar.

Otherwise than above,—normal urine.

(Signed) T. O. Summers."

Treatment Directed.—To be kept extremely quiet, and cold to the head (the hair had been previously removed); cold drinks ad. lib., and some liquid nourishment if she should be-

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come sufficiently rational to take it. Visit at 5 P. M. Has had no attack since 2 P. M.; is now perfectly quiet, and answers questions when aroused; calls for water, &c.; pulse 100, temperature 100°, respiration 20; abdomen soft and not tender; uterus pretty well contracted. Treatment continued.

November 7, 9:30 A. M.—Still dull and somewhat stupid, but answers questions correctly when aroused; has passed a quiet night, sleeping most of the time; no fits or delirium; discharged one pint of urine this morning; pulse 92, and of remarkably good volume considering the amount of blood lost, post-partum; temperature 90°, respiration 19; face pale and slightly œdematous, especially under the eyes*; tongue with white coat; still some thirst, but not urgent; feels hungry. No dejection from the bowels, no mammary secretion; lochia normal; the uterus is too voluminous—twice the ordinary size for the second day; the abdomen soft and flaccid, not tender. Treatment continued.

5:30 P. M.—Quiet and rational. Pulse 90, temperature 100°, respiration 20. Feels very hungry, is calling for something to eat; some thirst; bladder discharged; lochia natural; uterus reaches nearly to the umbilicus, but not painful or tender. She has passed a quiet day and has had some refreshing sleep; has taken fluid nourishment freely, as chicken broth, gruel, &c. Treatment continued.

November 8, 9 A. M.—Pulse 82, temperature 99.8°, respiration 20. Urine in 24 hours, one and a half pints; no dejection from bowels; uterus reaches to umbilicus, not tender; lochia scanty and not much colored; no mammary secretion; tongue moist and white. She is clamorous for food. Treatment—Enema to move the bowels at 4 P. M. Other treatment continued.

November 9, 9 A. M.—Pulse 92, temperature 100.2°, respiration 20. Urine 24 hours *three and half pints*; bowels moved freely by the enema; mammary secretion commencing; lochia normal; some thirst; tongue white; *very* hungry. Treatment.

*There was also considerable œdema of the lower extremities.

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Children ordered to the breast. (This had not been done up to the present time, on account of the great necessity of keeping the patient very quiet, mentally and physically.) Enema to move the bowels at 4 P. M., pill at 9 P. M.—R. Hydrarg. C. mite gr. i, ext. Hyoscyamus gr. i, pulv. Dov. Camph. gr. i,—to be repeated in the morning if necessary.

November 10, 9 A. M.—Pulse 90, temperature 99°, respiration 20. One pill acted *three times copiously*. Uterus diminishing in size; abdomen soft and natural; locia normal; free secretion of milk. General appearance very much improved. From this day the patient convalesced favorably, according to the reports of her mother, which were made every day or two. On Saturday, the 15th, at 5 o'clock P. M., I was requested to visit her. The nurse stated that on Thursday afternoon, 14th inst., she appeared feverish and was restless until after midnight. On Friday the symptoms returned, and passed of with a copious perspiration about the middle of the night. On Saturday, when the symptoms returned, and with *increased intensity*, "it was thought best to send for me."

Pulse 112, temperature *105°*, respiration 20. Complains of general soreness over the whole body, with acute pain in the *back* of the *head* and *neck;* tongue white and dryish; thirst urgent; no appetite; great diminution of mammary secretion; lochia scanty and extremely offensive; abdomen tympanitic, but *not very tender;* bowels regular; urinary discharge free. Treatment—Pill at bed time.—R. Hydrang. chl. mite grain i, ext. Hyoscyamus gr. i, pulv Dov. camph. gr. i,—to be repeated in the morning if necessary, and after the action to take quinine, grs. iij every 2 hours in the absence of fever.

Nov. 16th, 9:30 A. M.—Pulse 88, temperature 101.5°, respiration 22. The pill operated very freely several times during the night. Fever subsided at midnight, and was followed by a *drenching* sweat. Pain and soreness greatly diminished; appetite improved; thirst almost gone; abdomen soft and natural; mammary secretion increased; lochia scanty but not offensive. "*Feels much better*." Ordered tinct. Opii.

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camph., dr. ii, to be repeated if there is any disposition to use the bed-pan again. Quinine, grs. iij every 2 hours, with nutritious liquid diet.

Nov. 17th, 9:30 A. M.—Pulse 88, temperature 101.2°, respiration 22. Still has some thirst and drinks water freely (*and this has been permitted all the time*); urinary secretion copious; mammary secretion greatly increased; lochia scanty and very little colored, *normal;* no dejection from the bowels; no fever; has taken 30 grains quinine. Treatment continued.

Nov. 18th, 10 A. M.—Pulse 70, temperature 99.2°, respiration 20.—All of the symptoms better; is improving rapidly. Treatment—Quinine, grs. iij *ter die*, enemata to move the bowels when necessary.

From this time my patient steadily and rapidly improved, and was soon restored to perfect health, and has not had an unfavorable symptom of any kind.

March 26th, 1874.—Has not been sick a day to this date, since November, 1873.

Cases of Eclampsia Puerperalis are infrequent, and possess more or less interest to the profession. I have therefore given a *diffuse clinical* history of this case, in order that every important fact might be brought out, and also that it might constitute the basis for a few general remarks on the subject.

PATHOGENY.

Eclampsia is an acute symptomatic affection of the motor system of nerves, characterized by *clonic* and *tonic* spasms of the muscles of relation,—sometimes involving the unstriped muscles.

I wish to express my opinion, *ab initio*, that a large majority of cases of Eclampsia Puerperalis, as well as convulsions occurring in other conditions, are due to retention in the blood of the products of disassimilation, and their poisonous effects upon the nervous system.

ALBUMINURIA.

Soon after the discovery of albumen in the urine of preg-

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nant women, by Rayer, (about 1840, I think,) the frequent coincidence of Puerperal Eclampsia and Albuminuria was observed by Lever, Simpson, Regnault, Frerichs, DuBois, Cazeaux, Blot, Litzman, Braun, and *many others*. This coincidence was so marked as to direct the minds of the whole profession to Albuminuria, as the most important factor in the etiology of the disease.

What relation do these two pathological conditions bear to each other? The most eminent authorities differ very widely on this point, even at the present day. I do not hope to be able to settle these discordant professional views and opinions, but propose to contribute the result of my own observation and experience.

It is contended by many authors that the presence of albumen during pregnancy necessarily presupposes the existence of Bright's disease of the kidneys. This is admitted as regards a small proportion of cases, but in such the disease either proves fatal in the first eclamptic seizure, or continues, and the symptoms recur in each succeeding pregnancy, until the unfortunate sufferer falls a victim to it.

But Albuminuria is not regarded now,—as formerly,—as synonymous with Morbus Brightii. Albuminuria occurs in many acute diseases, as diptheritis, scarlatina, etc.; and from suppression of the cutaneous transpiration from cold and damp weather, and sudden alternations of temperature, &c. In such cases its appearance is transient and soon passes away. In a large majority of cases puerperal Albuminuria is due to *congestion* of the kidneys, and may be referred to the following causes:

1. Hypostatic congestion, induced by pressure upon the *ascending vena cava.*

2. Direct pressure, which prevents the outflow of blood from the emulgent veins of the kidneys.

Potent among the causes in the production of the above conditions, are—

1. Hydramnios.

2. Double pregnancies,

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3. Illegitimate pregnancies, in which there is a constant effort at concealment.

4. Primiparous pregnancies, in which the abdominal walls are tense and unyielding, and powerful counter-pressure is produced upon the kidneys. Statistics show that eighty per cent. of all cases of Eclampsia Puerperalis occur in primipara.

5. The wearing of *corsets* and *tight dresses*,—a folly peculiarly characteristic of females of the present day. I have noted a decided increase in the frequency of eclamptic seizures among the females of the negro race, since they have been enabled, as one of the results of their freedom, to procure these abominations and *follow the fashion.*

The urine in these cases may be highly albuminous, and may present all of those varieties which are recognized in Bright's disease, and yet, after a fortunate labor, they may all disappear in a few days—thus showing conclusively that the symptoms were dependent upon a temporary cause.

But whether the albuminuria is due to Brightian degeneration of the renal organs, or congestion from the causes enumerated, it does not, *per se*, produce eclampsia. The presence of albumen is not unnatural to the blood, and even in considerable excess above the normal amount contained in that fluid, could not produce toxæmia. The discharge of a large quantity of albumen by the kidneys might induce an anæmic condition of the blood which might predispose to hydræmia, to leukæmia, &c., and in some instances to the development of nervous phenomena. But the appearance of albumen in the urine indicates a *pathological condition*, which prevents the excretion of the poisonous principles which result from *tissue metamorphosis.*

URÆMIA.

From suppression of the normal function of the kidneys, the materials which should be excreted by them may be retained in the blood, thus constituting uræmia. The most important of these, according to the light which we now have, is

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urea. The amount of urea produced daily, according to Lehmann, Dalton, Flint, and others, is from 500 to 748 grains! Its presence in the blood in normal quantity may not produce the phenomena of uræmic intoxication, but when its excretion is partially or wholly prevented, the accumulation, at the rate of five hundred grains daily, or even half the quantity, would soon be sufficient to poison every drop of blood in the organism. Even if there should be partial excretion, and the amount retained daily should be *considerably* less than what is actually preformed in the blood, still, after the lapse of days or weeks, (and this condition is known to thus persist,) the quantity in the blood would be enormous. When it *thus accumulates*, it produces toxæmia. It has been contended by Frerichs and other eminent authorities, that uræmic intoxication is not produced by urea, nor by *any* other ingredient in the urine, nor by any *excrementitial matters* of this fluid; but that urea, after its accumulation in the blood, is transformed into carbonate of ammonia by some peculiar ferment (?), and that carbonate of ammonia is the poisonous agent which produces the disturbances of the nervous functions. The question, as to the immediate toxic agent in uræmia, is not by any means determined. In the absence of positive demonstration that it is produced by conversion of urea into carbonate of ammonia in the system, I think it most probable that it is urea, or some *poisonous* ammoniacal salt as the *cyanate*, but *certainly not the carbonate*, which may be administered *very freely* in disease, and is readily absorbed and taken into the circulation, and may be continued for days or weeks without giving rise to any nervous disorder. The conversion of urea into carbonate of ammonia is the most favorable chemical change which it can undergo, as in this form it can be more readily excreted, and is less harmful to the organism. It has been urged that the toxic agent in uræmia is *creatin* or *creatinin*, or other *extractives*. Now, the blood is not an ordinary chemical fluid, subject to all of the laws which are met with out of the body, but is a "*complicated mixture*," and contains a number of organic bodies liable to various metamorphoses. It is

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maintained at a high temperature, and it does not require a very potent agency to disturb the chain of these inconstant bodies, which are constantly going the round of the circulation. This may be illustrated by noting the changes which urea may undergo.

The difference of constitution between the three isomeric compounds, ammonium cyanate, urea, and carbomide, may be thus represented:

C. { N. '''
O. N. H. 4 = Ammonium Cyanate.
(N. H.) '' }

C. { N. H2.
O. H. = Urea. }

C. { N. H2.
N. H2.
O '' = Carbomide. }

These rational formulæ are deduced from the empirical formula common to each = C.O.H4. N2.

Urea may be decomposed into ammonia and cyanic acid, as follows:

C.O.H4. N2. = C.N.H.O + N.H3.

Cyannuric acid is a polymer of cyanic acid, and represented thus:

3C.N.H.O. = C3.N3.H3.O3.

Fulminic acid is also a polymer:

2C.N.H.O. = C2.N2.H2.O2.

Fulminuric is isomeric with cyanuric acid:

C3.N3.H3.O3.

Thus, it will be seen that urea may be converted into numerous *poisonous* compounds. It is probable that changes similar to these which are produced by the chemist in his labratory may be set up in the blood by various influences. It is always at a temperature which would facilitate such processes. There is in it a quantity of free oxygen, soda, ammonia, and many other elements in a condition ready for combination; and so, many inscrutable changes may be constantly going on in it. Thus, we may account for the sudden supervention of most violent and dangerous symptoms occasionally, in the

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progress of diseases seemingly pursuing a favorable course.

Uræmia produces various pathological phenomena, especially in the nervous system, as cephalalgia, neuralgia, disordered vision, restlessness, jactitation, delirium, coma, convulsions, and death; and occasionally symptoms very similar to the poisonous action of strychnia.

Uræmia is not necessarily dependent upon albuminuria. In the case herewith reported unmistakable symptoms of uræmic intoxication existed, and the phenomena presented by the case were undoubtedly due to this condition; and yet, after a most careful chemical analysis of the urine, *no* albumen was found, and the *absence* of urea from the urine was *distinctly noted*. The presence of albuminuria is not an essential element in the pathological condition which produces uræmic eclampsia, as asserted by Carl Braun, Cazeaux, and many others.

Uric acid is another organic constituent of the urine which may be retained in the blood, and undergo chemical changes similar to those predicated of urea. The *poisoned* condition of the blood which *it* causes has been called uricæmia. Retention of principles styled *extractive matters* may also give rise to *blood-poisoning*. Without being able to give all of the changes that may occur in the poisonous principles retained in the blood when the renal organs fail to depurate it, I desire to express the opinion, as the result of my observation and a long practical experience, that the retention in the blood of an excess of the poisonous principles of the urine, from *any cause* constitutes the *dominant factor* in the etiology of eclampsia gravidarum, parturientium et puerperarum, and also in many of the convulsive seizures, which occur in the progress of diseases. But the products of disassimilation are not only secreted by the kidneys, but by the skin, the lungs, the liver, and the mucous membrane of the alimentary canal. An arrest of the excretory functions of any of these organs may cause an accumulation of poisonous matters in the blood. The causes which interfere with the functions of the kidneys during pregnancy may also greatly disturb the action of the

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liver, and produce cholæmia, or a special form of toxæmia, called cholesteræmia. A case of cholæmia, resulting in coma, convulsions and death, occurred in my practice several years since, in a primipara, at the sixth month of gestation. It is possible that strong mental emotion, great nervous excitement or the presence of a large quantity of irritating matter in the alimentary canal might give rise to an attack. The nervous system in pregnancy is often in a morbidly sensitive and excitable condition, due, according to the older authorities, to the *pregnant state.* Future investigation may prove, that however morbid or excitable the subject may be, in cases in which eclampsia occurs, there is a pre-existing and underlying pathogenetic cause. Dr. A. Flint, jr.,* says, that "while there are many effete substances that we have been able to recognize, there are probably others which have thus far escaped observation. It is almost futile to speculate on the probable bearing which the discovery of new excrementitious principles will have upon pathological conditions, while there are so many which we now know only by name, their relations to the different tissues being still obscure; but if we reason from the light thrown upon certain diseased conditions by the fact that urea, the urates, and cholesterine are liable to be retained in the blood and produce *certain symptoms*, we may safely infer that the description of new effete principles will have an important influence upon our pathological knowledge, as well as our comprehension of physiological processes." Here is a field for physiological chemistry, and pathology is to be advanced by investigations in this direction, and more is to be expected for the advancement of the art of medicine from this source than from the discovery of new therapeutic agents. *Nearly* all that has been accomplished in the last half century has been thus brought about.

CHLOROFORM.

This agent is incomparably superior *to all others*, in the control of the symptoms of puerperal eclampsia, and were I re-

*Physiology, 1870, p. 391.

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duced to the necessity of selecting one single remedial agent, my choice would be for chloroform. It is the most prompt and certain remedy we possess, for moderating and controlling the eclamptic paroxysms, and may be used with comparative safety for a sufficient length of time in a large majority of cases. No case of death has resulted from its use in these terrible emergencies, so far as I have observed. According to the opinion of Prof. C. A. Budd,* of the University of New York, females attacked with convulsions seem peculiarly exempt from the injurious influences of chloroform. It is to be preferred to ether, as its effects are more prompt and decided, and the patient is more readily and easily brought under its influence, and there is much less general excitement, nausea, &c,, produced by it.

Elliot, in his Obstetrical Clinic,† states that there is in New York, a preference for sulphuric ether, "in general surgical practice and for *general use.*" "Some years ago a patient died under chloroform in the surgical wards of the city hospital, and that agent was then banished from use in that institution. But since that time another one has died from sulphuric ether, and *this* anæsthetic continues to be used from the conviction of the staff that it is safer than chloroform." "These influences do not, however, obtain to the same extent in obstetrics, for therein chloroform has been shown to act *reliably, powerfully*, and with trifling risk; while in no class of cases are its benefits more apparent than in those we are considering,"—*Puerperal Eclampsia.*

FORCEPS.

To evacuate the uterus at the earliest moment practicable is of the first importance. This holds good in all cases in which the patient is laboring under repeated attacks of convulsions, and more especially if the urine is charged with a large quantity of albumen, or there are unmistakable

*Obstetrical Lectures, 1867-8.

†Obstetrical Clinic, 1868, p. 64.

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symptoms of uræmia. If the labor has advanced to the second stage, and the head does not advance as rapidly as possible, apply the forceps and deliver. In the R. O. P. position, when the occiput rotates into the sacral cavity, it is still more important; and in the L. O. P. position, when posterior rotation occurs, the use of the forceps under *any* circumstances nearly always becomes indispensable. If the labor is in the first stage, and the os uteri is not dilated, use Barnes' dilators, and then apply the forceps. The skillful use of the instrument is to be preferred to version or any other operation, *as a rule.*

POST-PARTUM HÆMORRHAGE.

I do not propose to enter into the general treatment of this accident, but only to mention a few points in connection with it. 1. A novel method of producing cold, which has been lately practiced in New York and with very great success, is the application of ether spray over the abdomen. 2. The injection of the persulphate of iron into the cavity of the uterus. I mention this treatment *but to condemn it.* The injection of powerful astringents might prove irritating and cause metritis, &c. Two cases have recently been reported in the medical periodicals in which death resulted from it—*post hoc,* it is contended by the advocates of the measure, but it was more probably *propter hoc.*

In the case reported the loss of blood was *very great,* notwithstanding the use *of all* of the ordinary means of prevention and arrest. But after this immense depletion, the *convulsions continued with increased frequency and terrific violence.* Prof. Fordyce Barker, whose clinical lectures, delivered in Bellevue Hospital, New York, have been recently published, takes strong ground in favor of venesection in sthenic cases of peuerperal convulsions. But the greatest loss of blood, even *ad deliquium animi,* does not *in any case* tend to arrest the paroxysms and may directly increase them. If practiced in plethoric conditions it must be premised in the *onset* of an attack, and not after there is any considerable hemorrhage, and even here,

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it will have little or no influence in arresting the attack, but may possibly render the subsequent symptoms more mild and controllable. I have used the lancet freely in every single case which it has been my fortune to treat, except the one reported, and I never saw the *convulsive seizures* controlled or favorably *modified* by it in a single instance. General depletion may *easily* produce puerperal thrombosis, pyæmia in child-bed, great prostration, and a train of evils with which every experienced practitioner is familiar. Exceptionally *it may* do good, but I think it must be in very *rare instances.* The application of cold to the head has more influence in the relief of the hyperæmia of the brain than depletion by the lancet, cups, leeches or any other means. The cold douche, ice, &c.

In conclusion, I must beg the pardon of the profession for a dogmatic assertion of opinions, as it is impossible within the limits of a contribution of this kind, to attempt an elaborate argument in support of the positions assumed.

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ANATOMY AND DISEASES OF THE CERVIX UTERI.

BY. J. S. WEATHERLY, M. D.

A short time since, at the request of the President of the Montgomery Medical and Surgical Society, I hurriedly prepared a short paper upon the Anatomy and Diseases of the Cervix Uteri, which I read to the Society. Some of my friends were partial enough to suggest that I should bring it to Selma and submit it to the State Association. At the time I thought I would amplify it, and try to make it worthy of your consideration. Circumstances, however, prevented my doing so, and I shall read it with little alteration from the original draft.

I make no claim to originality, and have no startling facts to relate. I have simply endeavored to condense, in as small a space as possible, the advanced ideas of Gynecologists of the present day.

First, I will give a brief sketch of the anatomy of the Cervix Uteri, taken from Tyler Smith's description, which you will find in *extenso* in that admirable book,—"Report of Columbia Hospital for Women, by J. Harry Thompson." A book worthy of its accomplished author, and one that will be of great service to the profession at large.

The cervix uteri is composed of mucous membrane, fusiform fibre cells, white fibrous tissues, involuntary muscular fibres, with a copious supply of blood-vessels, nerves and glands.

The mucous membrane of the vaginal and external portion of the cervix, is of considerable thickness, tessilated or

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squamous, and forms a membrane of considerable thickness. On the free surface it is comparatively smooth, but its attached surface is rough and excavated from the projection of the villi or papillæ into the epithelial layer. Immediately beneath the layer of epithelium the basement membrane is found, covering numerous villi or papillæ, which stud the whole surface of the mucous membrane. The villi of the os uteri are generally single, but occasionally two or three villi are united together upon a single pedicle.

These villi present a very uneven appearance when the epithelium is removed, either by maceration or disease. The extremities of the villi, from which the covering of scaly epithelium has been removed by masceration, presents a very characteristic appearance when seen by a low power. They form an irregular fringe standing out from the surface upon which they are placed. As you will see in this plate,* kindly drawn for me by my friend, Dr. Means, in the centre of the point of each villus a depression is seen. When examined by a high power, each villus is found to contain a looped bloodvessel, which may be seen passing to the end of the villus and returning to its base, where it inosculates with the bloodvessels of the neighboring villi. These villi are everywhere covered by a thick layer of pavement-epithelium, which also fills up the intervals between them, rendering the external surface comparatively smooth, as seen by the naked eye. In the plate which I show you, the outlines of several villi, the vascular loops of the villi, and the layer of epithelium covering the villi are seen.

On passing within the os uteri, to examine the mucous membrane of the cervical canal, a small tract of smooth surface is generally found between the margin of the lips of the os and the commencement of the peniform rugæ. Occasionally the rugæ extend to the os itself.

The villi in the cervical canal are three or four times larger

*We are sorry to state, that plates could not be prepared in time for the publication of this paper.

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than those on the external portion of the os and cervix. They are covered with dentated epithelium, and the blood-vessels inosculate freely at their base. This figure, greatly enlarged, of course, will show you the villi of the cervical canal. I believe that it is not settled definitely, whether the papillæ of the os and cervix are supplied with nerves or not—some contending that they are supplied with nerves of sensation; others, that they are entirely destitute of nerves of any sort. The villi seem to be intended for the secretion of the fluid, which is poured out in great abundance, under excitements of different kinds.

Underneath the villi is found, both in the canal and on the external surface, a dense fibrous and vascular tissue, mixed with nerve-fibres and involuntary muscular fibres; the muscular fibres becoming more plentiful on descending deeply into the structure of the walls of the cervix. Between the looped bloodvessels and the basement-membrane, numerous oil-globules and glandular cells are found. When the cervical canal of a virgin uterus is laid open, it is found to contain four columns of rugæ, or folds of mucous membrane, the rugæ being arranged in an oblique, curved, or transverse direction. Between these rugæ four longitudinal grooves are usually seen,—the two on the median line, anteriorly and posteriorly, being the more distinct.

The canal is flattened in shape. Two of the rugous columns are arranged on the anterior surface, corresponding to the anterior lip, and the other two upon the posterior lip. The rugæ of each column, as seen by the eye alone, vary from ten to fifteen in each column. In the healthy state the transverse rugæ, with the fossæ between them, are covered with a viscid and transparent mucous, and when this is brushed away a reticulated appearance, covered by numbers of secondary rugæ, is visible in the mucous membrane beneath.

Besides the four rugous columns and furrows between them, which are found in the well developed cervix, other rugæ of irregular shape are seen, particularly at the upper

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and lower portions of the cervix, where the regular transverse or oblique rugæ become indistinct.

The cervical rugæ have been compared to a tree, a fern leaf, &c. Of course, after child-birth, this arrangement becomes somewhat confused and irregular.

Under the microscope, besides the primary rugæ, each fossa is seen to be subdivided by smaller rugæ, from which curved septa still more minute take their origin, dividing the principal fossæ into a great number of crypts, arranged like a fine piece of net-work. But, besides the fossæ between the rugæ, the spaces between the rugous columns, and the longitudinal sulci themselves, are all seen to be covered by multitudes of mucous follicles. These mucous follicles are supposed to number at least ten thousand in the well developed virgin cervix.

When a longitudinal section is made through the middle of one of the rugous columns and viewed laterally, fossæ are found to extend obliquely and deeply into the structure of the cervix, sometimes to the extent of 1-6 of an inch or more, and occasionally mucous openings pass into the centre of the wall of the cervix, and may be seen filled with the tenacious mucus, proper to the cervical canal.

Villi, similar to those found in the lower part of the cervix, extend to the glandular surface of the canal, and are found in considerable numbers on the larger rugæ, and other parts of the mucous membrane in this situation. Thus the entire organization and disposal of the mucous membrane lining the canal of the cervix uteri, are such as to afford a very large extent of glandular surface, for the purpose of secretion. In fact, the cervix uteri is an open gland, and it performs all the functions fulfilled by glands in other situations.

It will be seen that from the nymphæ to the entrance of the fundus uteri, the glandular structures are arranged at two principal stations, namely, at the ostium vaginæ or cervix vaginæ, as it might be called, and at the cervix uteri.

There is no apparatus for any considerable mucous secretion in the space between these two points. The glands at the

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ostium vaginæ secrete an oily fluid for lubrication; its reaction is acid. The secretion from the cervix uteri is alkaline.

I have been so much troubled myself at not finding any description of the minute anatomy of the os and cervix, that I have run the risk of wearying you with these details. The description of the anatomy of the cervix from which I have condensed this report, is really the only attempt at a description of the minute anatomy of the cervix that I have been able to find.

As having some connection with the anatomy, and especially with the physiology of the cervix, I will here allude to a subject that I have frequently heard discussed, both by physicians and laymen. It is rather a delicate subject, yet its physiological and pathological bearings may be of very great importance.

The question referred to, is whether there is a discharge from the female during the act of coition, attended by the same feeling as that caused by the discharge of semen from the male, and if so, where does it come from? I know that it will be said, that authority has settled this question, but the authority of fifty years ago is not the authority of to-day on many subjects; and the searching investigations of scientists of the present day are playing sad havoc with many points that were once thought to be settled by undoubted authority.

Now we see that the cervix is not only erectile, but that it is also a gland, and I am inclined to think that it becomes erect under strong amorous feelings, and that in some females, I will not say in all, (for I believe in the majority of women, the act is merely passive, and not attended with any particular feeling of pleasure,) that this erection culminates in a copious discharge of fluid from the interior of the cervix uteri, which is followed by relief of the erotic orgasm, just as in the discharge of semen from the male.

Several years ago, I had a patient whom I was treating for uterine disease, kept up as I thought, by excessive coition who told me that she always had a distinct discharge during

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coition, and that it was followed immediately by the same kind of relaxation and relief as in the male. She moreover told me that she had at times lascivious dreams, which culminated in a copious discharge of fluid of some kind, and immediate cessation of the erotic feelings.

Now if the cervix becomes erect during the venerial act, and is followed by a discharge of mucous fluid from the os, we can easily understand why frequent coition, and especially the incomplete performance of the act, as is now so fashionable as a means of preventing conception, should lead to disease of the os and cervix.

The cervix is kept in a chronic state of erection, the papillæ are kept full of blood; they are not emptied and relieved as they would be if the act was completed by the discharge of fluid, and the result is chronic engorgement, inflammation, ulceration, &c.

I will now glance briefly at some of the most common diseased conditions of this portion of the uterus.

The first claiming attention, as being most frequently met with, is chronic cervical metritis, and endo-cervicitis.

I believe that, in probably nine cases out of ten, when called upon to treat a case of uterine trouble, the disease will be located in some portion of the cervix.

The causes of cervical metritis, which is a low grade of inflammation, confined to the external or internal mucous membrane, are too frequent sexual intercourse, imperfect coition, exposure to cold, abortions, too frequent child bearing, a general depraved condition of the constitution, the use or abuse of the sewing machine, &c., &c.

Patients suffering from cervical disease, complain of a general malaise; pain in the back, generally in the region of the sacrum, sometimes in the hips, attended with a sense of dragging down, particularly if the woman is on her feet much, standing giving rise to much more pain than walking. The pain frequently extends down the legs, and is sometimes felt in one knee; or, going upwards, is felt in one shoulder, arm, and frequently in the head, occasionally in the mammæ. Al-

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most always some pain is felt in the iliac regions, and nearly always on the left side. The bladder sympathises, as also the stomach, and we usually see a long train of dyspeptic and nervous symptoms, causing great annoyance to patient and friends.

In most cases a discharge of some sort takes place from the vagina. This is, however, not uniform, and I have seen some pretty bad cases of cervical disease, unattended by any external discharge. The character of the discharge depends upon the seat, and stage of the disease. In the first stage of simple endo-cervicitis, the discharge is white, resembling the white of an egg; sometimes it is curdled, by coming in contact with the acid discharge from the vagina. If erosion has taken place, and particularly if it has proceeded to ulceration, the flow is thick and yellow, or streaked with blood.

In some cases of endo-cervicitis, and also in the granular external ulcer, you will frequently find a bloody flow, continuing more or less from one menstrual period to the other, becoming very profuse at the regular times. Menstruation is disturbed in some way in most cases. Very rarely, you will meet with a case in which it seems to be natural.

As a general rule, menstruation is attended with pain, coming on before the flow sets in, and continuing at least through the first day, and often during the whole period. Occasionally the flow is diminished in quantity, and still more rarely, it is entirely suppressed. One case, which I treated over a year ago, had not menstruated for two years previous to her coming to me. She had endo-cervicitis, which was relieved by appropriate treatment. She became pregnant soon after returning home, and was delivered at full time.

Most frequently, however, you will find profuse menstruation, this being probably the most common symptom for which advice from the physician is sought. The menses lasting several days, leaving the patient much prostrated, and returning at the end of three, two, and sometimes as often as every week. In some cases the intervals become less and less, until finally it is difficult to tell when the regular period ar-

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rives. This is particularly the case if there should be a mucous polypus in the cervical canal, in connection with the inflammation or ulceration.

Two patients treated by myself within the last few months had this complication. An extensive inflammation and ulceration of the os and cervix was the first thing diagnosticated and treated in both cases; and it was only after the external trouble was subdued to a great extent, that I discovered the small polypi, just within the os. These were removed, and in the first case the next menstrual flow was smaller in quantity and more natural than it had been for years previous. The other case has ceased to menstruate, but there was no more bloody discharge after the destruction of the polypus.

The symptoms detailed above may go on for years, occasionally better, especially if the sufferer goes to the springs, or is separated from her husband for a few months, but always getting worse when she returns home again. Most commonly, however, there is a regular progression from bad to worse, until medical aid is sought. Too frequently, I fear, when advice is applied for, a false delicacy on the part of the patient, or of the physician, causes the true disease to be ignored, and the stomach of the poor patient is made the receptacle of innumerable drugs that have no other effect, as a general rule, when local treatment is not employed at the same time, than to annoy the patient.

In a case of suspected cervical disease, I never consent to treat a patient without an exploration by means of the speculum. I know of no way of properly diagnosticating or treating diseases of the os and cervix without the use of this instrument. As to the proper kind of speculum to be used, ordinarily the glass cylinder, covered with gutta percha, answers every purpose. It is easy of application, and causes less exposure of the patient, (which is a great desideratum in private practice) than any other instrument; and is quite sufficient in the great majority of cases for diagnosis and treatment. I often apply sponge tents through them with perfect ease.

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If an operation has to be performed, or in a case where you are compelled to have assistance, there is no instrument equal to Sims' speculum. Next to the cylinder, for private practice, I prefer Nott's instrument. It is the only self-retaining speculum that I have seen that would answer the purpose. The operator can dispense with assistants, as he has the use of both hands.

The os and cervix being exposed, if inflammation exists, you will find the mucous membrane red and thickened; the os and cervix looking larger than natural, and if endo-cervicitis exists, you will see the os plugged up with a tenaceous mucus very difficult of removal. This state does not last long before the epithelum becomes abraded in one or more spots. These places are covered with papillæ, from the size of a needle-point to that of a large pin-head. This condition has been described by some authors as ulceration, but it is properly an erosion, and precedes ulceration.

There does not seem to be any loss of substance, but rather a superabundance, the papillæ being sometimes slightly elevated above the surrounding tissue. These points are exceedingly vascular, and the os presents the appearance in some cases of a large ripe strawberry.

When ulceration sets in, we see the defined edges of the ulcer, and also the thick yellow discharge consisting of pus, or pus streaked with blood. If the ulcer be irritable, the slightest touch is frequently followed by a flow of blood. I have frequently seen the bleeding so profuse as to be exceedingly troublesome during an examination. Blood often escapes from the enlarged papillæ, even if there be no ulceration. The diagnosis from a syphilitic or cancerous ulcer is not at all difficult to any experienced gynecologist. The syphilitic ulcer presents here the same appearance and characteristics that it does in other parts of the body; and gets well in a much shorter time than an ordinary ulcer. Some writers say, that it is very rare to find a chancre upon the os; but I am sure, that even in my limited experience, I have seen several cases.

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The diagnosis from cancer is still easier. The pain is acute and more lancinating in cancer; the whole uterus soon becoming hard and fixed; the hæmorrhage is more profuse, and there is generally an offensive, yellowish, watery discharge, which continues in cancer. Treatment of inflammation, erosion and ulceration of the os and cervix, is both local and constitutional, the local being by far the most important.

In the first stage, if there be much inflammation and engorgement, I do not hesitate to apply leeches, shoving three or four down to the os through a cylinder-speculum. I think leeches much more effectual for local depletion than scarification, and if possible to get them I always use them in preference. Afterwards, or when leeches are not used, cotton soaked in glycerine, or glycerine and tannin is pushed up to the os, and is allowed to remain until next morning, when it is removed by means of a string which is tied around it. After its removal, tepid or cold water, according to circumstances, is freely used by means of a pump-syringe, or what is a very good substitute, one of those nasal douches with the nozzle of a female syringe in the end of the rubber tube. The bottle being elevated, all the woman has to do is to hold the tube in its place until the water is exhausted from the bottle. Every three or four days a mild solution of nitrate of silver, tinc. iodine, tinc. ferri chlorid., or solution of persulphate iron is used. These latter remedies may be used either pure or diluted, according to circumstances.

If ulceration exists, the solid nitrate silver is a most admirable remedy; it should always be passed well up into the cervical canal. If the os and cervix are too small to admit of the proper application of remedies, use a sea-tangle or spongetent, dilate the canal, and then carry your remedies up to the affected point, which you will frequently find deep in the cervical canal.

Sometimes it is found that nitrate of silver either does not cure the case, or, in fact, seems to aggravate the symptoms. If this should be the case, I know of no better remedy than pure nitric acid. I apply it both externally and also into the canal itself.

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It produces no pain, is not followed by the bloody discharge which frequently succeeds the application of the nitrate silver. I have never seen any bad effects from its use, but frequently great good. If there is much tendency to hæmorrhage, the liquid persulphate ferri is a most admirable remedy. I have seen numbers of cases get well under its use alone. I frequently saturate cotton with it, and leave this in contact with the ulcerated surface for several hours. I have also used iodoform in powder and as an ointment. In some cases, attended with pain, an ointment composed of iodoform and belladonna, or stramonium answers a good purpose.

One thing I always insist upon, and that is absolute cessation of sexual intercourse during treatment. One great reason why some of our patients, who become tired and go off to consult some of our more celebrated gynecologists, get well so rapidly, is from the fact that their husbands are left at home. These cases are nearly always troublesome, and we should tell our patients at the commencement that the case is necessarily slow, taking months and sometimes years before entire relief is effected. Erosion or even ulceration is no absolute barrier to conception, and you will frequently see women bearing children whom you know to be suffering with disease of the os and cervix.

They frequently abort, but as often they go on to full term; sometimes improving during pregnancy, but always getting worse after confinement.

The next most important condition of the cervix, is stricture or narrowing of the canal, and dysmenorrhœa as an effect of it.

Gentlemen, no doubt, all of you, have your peculiar views upon this subject; for it is well known that leading gynecologists differ very widely upon this subject. But as this proposes to be a practical paper, I shall not enter upon the various theories in regard to dysmenorrhœa, but confine myself strictly to the condition of the cervix, as a cause of that most distressing affection.

I know from personal experience that dilatation of the cervical canal is frequently followed by relief of the distressing

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symptoms, and in at least two cases of my own, pregnancy was the direct consequence of the dilatation.

Stricture or narrowing of the canal, may be either congenital or the effect of disease. It is always the cause of painful menstruation. I do not say that painful menstruation is never caused by any other condition of the uterus. What I mean is, then when you have this small canal, you will also find it accompanied by trouble at the menstrual period.

The remedies for this condition of the os and cervical canal are the knife and mechanical dilatation.

As a general rule, the seatangle and sponge-tents will soon accomplish with safety, sufficient dilatation to relieve all trouble.

Of late years very few gynecologists resort to either Sims' or Simpson's method of division of the neck. In rare cases it may become necessary, and when it is so, I would prefer Sims' method, by scissors, as being more complete, and more satisfactory afterwards.

I have operated according to the teachings of both these great masters in uterine surgery, but of late years I have relied entirely upon dilatation by means of tents. If there should be much irritation about the cervical canal I prefer the seatangle-tent. The great objection to this tent, is the difficulty in keeping it *in situ*. To be sure of preventing its escape from the canal, the vagina should be pretty firmly plugged with cotton.

Ordinarily, there is no objection to the sponge; it produces a much more powerful effect, and rarely gets out of place.

Recently some one has recommended the rapid dilation of the os by instruments similar to those used for dilation of the urethra. I have had no experience with this method, and am not much disposed to favor it.

Cancer is a common disease of the cervix. I shall not detain you by a description of the symptoms of this most painful and disgusting affection, and have only one remark to make in regard to its treatment, and that is, if the disease is detected before the body of the uterus or the vagina has

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become affected, I would recommend immediate amputation of all of the diseased mass. I believe life may be prolonged, and in some few cases there will be no return of the disease.

Here I will take occasion to correct an error that has been going the rounds of the medical press for the last few years, viz: that the negro race is exempt from cancerous affections of the uterus.

Fordyce Barker, I believe, first announced it, and, if I am not mistaken, was sustained by the lamented Nott.

Now, I am sure that it is a mistake. I have known several negro women to die of cancer of the womb, and several of my medical friends report similar cases, as having occurred in their practice.

The os and cervical canal are frequently the seat of polypoid growths, usually of the mucous variety. I have seen the most alarming hæmorrhages produced by one of these little growths no larger than a pea. They can be twisted off, removed by the knife or scissors, or if in the canal, sometimes a sponge-tent will remove them by pressure.

Hypertrophy of the os and cervix may be congenital, but most freqently it is the result of previous disease. If troublesome, amputation is the remedy.

The conical cervix, I believe, is always congenital, and is considered by most gynecologists as a sure barrier to conception.

One of the most perfect cases of this kind, however, which I have ever seen became pregnant after free dilatation with sponge-tents. Amputation is the only remedy advised by most authors.

I will now bring this paper to a close, with many apologies for having detained you so long with details, which I fear have only wearied without interesting or instructing you.

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PNEUMOGASTRIC NERVE.

AN INTERESTING CASE,

Reported by W. H. ANDERSON, M. D., *Professor of Physiology in the Medical College of Alabama.*

[This paper was read before the Mobile Medical Society, and sent up by that Society to the Alabama Medical Association.]

I was called to see a lady in the sixth month of pregnancy, who was taken suddenly with a severe pain in the right upper maxilla. She had suffered thirty-six hours when I saw her, and sent for me to see if a gumboil was not forming. On examination, I found every thing natural, and informed her that the pain must be neuralgic. I gave her half a grain of morphine, which temporarily relieved her sufferings, and she went off to sleep. I knew from previous treatment of the lady that she bore morphine well, without any after consequences. After six hours sleep she waked up with a different train of symptoms. The pain had disappeared, but there came on intense salivation, distressing nausea and vomiting, and a sense of burning from the fauces to the stomach, including this latter organ, almost intolerable. The only relief for this burning was to keep pounded ice to the throat and upper part of the sternum, and this only partly relieved it. The pulse was quiet, the heart-beat natural, no fever, and no rise above the normal standard of the thermometer placed in the mouth.

This state of things continued for forty-eight hours, until I became alarmed lest the retching would produce miscarriage. I asked her why she put ice on the breast. "Because," said she, "my lungs are on fire." Notwithstanding this, the breathing was perfectly natural. There seemed to be little desire

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for cold drinks, and even the water from ice melted in the mouth when swallowed, came up immediately. Morphine had no effect on this burning, although it produced sleep, which was, however, disturbed by the constant flow of saliva.

The case gave me great anxiety, and I set to work to investigate it physiologically. In our youth, Mr. President, we are satisfied to relieve our patients in any way that we can, and we search for prescriptions from books and other sources, until in our ordinary practice we settle down to a routine course, independent of rationale and philosophy. But when we grow older, we are not satisfied to cure only. We feel the promptings of our higher nature, and wish to reason on the subject, to see if perchance we can not rise above the ordinary level, and ascertain the causes of things, as well as analyze other phenomena which bear important relations to the subject under consideration. This is philosophy, and it is that talent which, coupled with the moral conscience, distinguishes man from the brute, and distinguishes, too, the cultivated man from the vacant and listless multitude.

I say, therefore, I began to investigate the case physiologically. The *burning*, thought I, must be a nervous phenomenon. But how can a nerve *burn?* When irritated, the province of a sensitive nerve is to be painful; that of a motor nerve is to produce contraction; that of a nerve going to a gland is to produce secretion and chemico-vital action. Here, indeed, was increased secretion of all the salivary glands; but what could cause the terrible burning in the stomach, all over the lungs, and the full length of the œsopahgus? It must be some kind of congestion; but if so, why not a secretion from the bronchial tubes, or at any rate some difficulty in breathing, of which there was none at all? Then, again, I had seen the lady in an attack nearly similar, three years before, when at the same time of pregnancy, and had cupped the chest and stomach, and blistered the latter, without effect.

I reasoned, then, thus: There must be increased flow of blood to the capillaries of the glands, or else there would not be increased flow of saliva. Now, might not there be the

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same increased capillary circulation all over the lungs and in the stomach and œsophagus? That *burning* must be due to irregular capillary circulation. Analogy rather tended to prove this, because the feet burn when there is no fever; the palms of the hands often burn; the cheeks burn—all owing to irregular capillary circulation in the part. But how irregular? Was it contraction of the capillaries, or was it dilatation? The treatment of the two varied considerably, and I had no time now to try experiments. I fell back on the nervous system, the prime mover of all changes in the animal body; the mysterious power by which the fanatic reasons one way, and the calm philosopher another; the hidden phenomena of which make the paralytic motionless, while they give agility and increased action to the gymnast. Can I, then, refer to this protean source to get light to help me out in treatment? Shall I look to the sympathetic, or to the cerebro-spinal system? In my mind's eye I followed out the pneumogastric in all its wanderings, and found that nearly all the parts to which it was distributed were affected with the burning sensation. I then passed in review the nerves going to the salivary glands, and found that they also must be greatly at fault. But the nerves could only produce their effects through the bloodvessels, because it must be the bloodvessels that furnished food for such an abundant secretion. I remembered here some very curious phenomena which I had witnessed in living animals, particularly in the dog, and which bore on the subject directly and pertinently. I can not detail the experiments, because they would consume too much time for this occasion. The purport, however, was as follows:

The submaxillary gland is supplied by a nervous filament that is detached from the lingual branch of the fifth pair. Close dissection, however, proves that this filament does not come originally from the lingual nerve, but is only glued to it, as it were, for it is really a filament from the chorda tympani. Now when you cut this nerve just before it enters the gland, the blood going from the gland by the submaxillary vein is exceedingly black. But if instead of cutting the nerve, you

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galvanize it, and thus *excite* it, why then the blood going off by the vein is bright and scarlet like arterial blood. It is this nerve that regulates capillary circulation in the gland, and when it is excited the circulation is very active, and the blood flows so rapidly through the gland that it goes off by the vein as red as arterial blood. But then there is a counteracting nerve which goes to the gland also. This is the sympathetic. The sympathetic sends *two* small branches from the superior cervical ganglion to be distributed to the capillary bloodvessels of the gland. When these branches are excited, the capillaries are powerfully contracted, and the blood stays so long in the gland that it goes off by the vein very black. In other words, the circulation becomes sluggish and very little saliva is thrown out from it. When we excite the lingual branch, however, the circulation is rapid, so rapid that four times the amount of blood passes through the gland, that passed through it when it was in a state of repose. During this passage of so much blood, the gland pours out freely its saliva. The filament therefore coming from the chorda tympani produces dilatation of the capillaries. The filaments coming from the sympathetic, produce contraction of the capillaries of the gland. Thus, in a perfectly physiological state, these two forces keep up the balance, and neither contraction nor dilatation is excessive. But if we put some savory substance in the mouth of the animal, the sensitive nervous filaments react on the gland and overcome the balance, and the saliva is secreted because the chorda tympani is excited by such substance. Or, if we excite this nerve by galvanism, the balance is likewise broken up, the capillaries dilate, and the saliva is poured out. These phenomena, first noticed by Claude Bernard, are constant, when the operation is performed on the dog by cutting away the digastric muscle and exposing the nerve.

Being familiar with these facts, I tried to think of something that would either increase the power of the sympathetic, and thus contract the bloodvessels, or annul the excitement of the chorda tympani, and thus lessen the flow of blood to the gland, which would answer the same purpose.

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I knew atropia produced great dryness of the mouth, fauces and œsophagus, and supposed it must do this by diminishing secretion. So I gave my patient the one-hundreth part of a grain of atropia, which acted favorably in twenty minutes, and relieved both the burning and the excessive ptyalism. The burning throughout the lungs, the fauces and stomach, was no doubt owing to active dilatation of the capillaries. During this active dilatation, the nutrition of all the membranes of the parts affected is much interfered with, and the secretions are acrid—acrid, because the chemical interchanges of the salts of the blood do not go on in a normal manner. I repeat, the *nutrition* of the mucous membrane is interfered with. This is no hypothesis. We know it to be a fact. When the circulation, in any of the secretory glands, is abnormally quickened, the secretion is increased in quantity, but the nutrition of the gland is essentially lessened. In proof of which, the blood in the vein leading from the gland is always bright instead of dark purple, which it would be if the usual detritus of the tissue were poured into it. This active circulation is a local phenomenon, not dependent on an increase of the force or frequency of the heart's action. Numerous familiar instances of this might be mentioned if it were desirable to do so.

To return to the patient, I may say that the improvement from the atropia lasted twenty-four hours, after which all the symptoms returned, and were successfully combated by the same dose.

Let us now once more refer to the nervous system and see why there was no pain, but only a constant *burning* sensation. The mucous membranes generally have very little sensation, although freely supplied with sensitive nerves. Pain is very distinct from ordinary sensation. It is not an exaggeration of sensation, but is conveyed possibly to the nervous centres by separate filaments. Of this, however, there is no positive proof. The acrid secretions in this case gave rise to burning, but not to pain. If the same cause had taken place in the skin, or in a serous membrane, or fibrous

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one, the pain would have taken the place of the burning. The pneumograstric nerve throughout its whole course is nearly devoid of sensitive filaments that can take on painful action, and yet it is essentially a sensitive nerve. But its sensation is principally to convey to the medulla the impression that irritating substances are incompatible with healthy function. Thus, if too much carbonic acid accumulates in the pulmonary vesicles, the impression is conveyed to the brain. If a foreign body gets into the larynx, the same impression is carried to the nervous centre, and so on. But I need not dilate on this point, as it is familiar to physiologists.

In the detail of this case, Mr. President, we see how a knowledge of physiology may sometimes help us out in our practice. By such knowledge we were able to trace the effect to the cause, and to remedy it by appropriate treatment. Unfortunately we do not know as much about the action of the nerves in many diseases, as we know in this particular case. Experiments on living animals taught us the *rationale* of dilated capillaries and increased secretion in the case under consideration. If we could only analyze all other phenomena connected with diseases, we would know how to apply our remedies with more certainty of success, and our therapeutics would be so much the more simple and the less hurtful. I confidently expect the day will come, unfortunately not in our time, when very few medicines will be needed, and when those few will nearly all be addressed to correcting vices of nervous action. When we think of the one hundreth part of a grain of atropia relieving the distressing symptoms of this lady, we are lost in wonder that this invisible speck could have accomplished such a change. We learn from it, however, one great and important truth, viz: that the nerves and nervous centres should never be lost sight of in the treatment of any state of the system which is a departure from health.

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REPORT ON THE MORTUARY STATISTICS

OF THE CITY OF SELMA, ALABAMA,

For a Period of Twenty-nine Months, extending from August 1st, 1871, to January 1st, 1874.

BY BENJ. H. RIGGS, M. D.

TOPOGRAPHY.

Selma is a small, well-built city, situated on a bluff on the Alabama river, on a deposit of sand overlying the cretaceous formation of the Mesozoic period, being in the midst of the cretaceous (cotton) belt of Alabama. It is on a peninsula formed by two creeks opening into the river in the suburbs. It is only 236 feet above the level of the Gulf of Mexico; it is 30° north of the 32d parallel of latitude; longitude 87° 10" west of Greenwich; the streets are wide and regularly laid off; Broad and Water streets being 100 feet wide, and the others 90 and 80 feet wide; the dwellings are principally of wood, the stores of brick; the yards are large, generally, and planted in shrubbery and shade trees; shade trees also line both sides of the streets, and sometimes a row down the centre. The river in the summer gets very low, and exposes much of its bed to the drying effect of the sun's rays; and, in my opinion, this low stage of the river corresponds with the greatest death rate. The region of country in which Selma is situated, according to Gray's Atlas, is subject to an annual rain-fall of 55 inches; it will be seen by reference to table No. 1, that this statement is about correct, as the rain-fall for 1873, as reported by Col. Cadle, who kept the meterological phenom-

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ena for the Smithsonian Institute for that year, was 54.97 inches. The mean temperature through the year is 66°; the temperature (mean) for the summer is 82°; for the winter 50° (Gray's Atlas); thus presenting a difference between summer and winter of 32°. This is a wider range than we observe in some other sections of our country, and less than in others. One would infer from the above description that we have here a fine agricultural country, but also a sickly one; and such is in the main, the truth. We have here an abundance of the factors of malaria, and our mortality is caused by malarial diseases to a greater extent than any other. I maintain that Selma, for several years, can show fewer deaths per 1000 of population than the surrounding country. Selma can be made a very healthy place; for the last two years it has been more healthy than heretofore; there have been no epidemic tendencies at at all; no prevailing types of disease; cholera and yellow fever have both been near us, but there have been no cases in the city. I attribute our improved condition to the greater care and attention, to general and local hygiene, bestowed both by the municipal authorities and the citizens under the instructions of the Board of Health. We have not yet done as much as the laws of health require, although probably as much as our present financial condition authorizes. I believe we could maintain a perfect freedom from epidemics and secure a very low death-rate by a strict adherence to the rules for the internal hygiene of cities, now known. I am satisfied that malaria, be it what it may, is of a heavy nature, and does not operate far from its source; in this vicinity its area of influence is circumscribed by a few feet. From this view I draw the rule that any city, town or county settlement in this portion of country, even in the most intensely malarial regions, can maintain healthfulness by attention to the laws of health, notwithstanding the disadvantages of its surroundings. One of the inseparable conditions to this is a perfect system of sewer or surface drainage; water must run off rapidly; there must be no sodden earth allowed to dry under the sun's heat. The population of Selma in this report is put down at 8,000;

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which is about 1571 more than reported in the census of 1870; it is believed that as this census was taken in summer it was not correct; and it is known that the population has increased since then; the census of 1870 gives a population of 6,429. By a late census of the children of the city taken for school purposes, there were found 2,896 children; thus, by the usual rule of one child to every four adults, which is a safe calculation, we get a population of over 8,000. I divide this 8,000 into 3,600 whites, and 4,400 blacks, giving 800 surplus to the blacks. The whites are generally professional men, farmers, merchants, and their families. The blacks are servants and small traders of various sorts.

MORTUARY STATISTICS.

This report is taken from the mortuary records of Selma, which were kept for the last five months of 1871 by the late Dr. C. F. Fahs, and for the years 1872 and 1873 by myself. There is a large number put down as "unknown". These were names gotten by me from the undertakers, and there having been no death certificates furnished, their diseases were not known, though I could by inquiry usually ascertain their race or color. I have also included in this report, and which, if left out would have lowered materially our death ratio per 1000, 16 cases of still-born children, 13 abortions and 11 deaths from old age; making 58, besides 5 from gunshot wounds; 3 from fracture of skull, and 1 from injuries by fall.

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Diptheria.....13
Accidents (falls from horse and tree) 2
Opium (mistake)..... 1
Febris malaria hæmorrhagica..... 8
Trismus Nascentium.... .10
Pertussis.....13
Debilitas..... 5
Apoplexia..... 1
Catarrhus 1
Strictura..... 1
Convulsio Puerperarum... 2
Erysipelas..... 1
Vulnus Sclopeticum..... 5
Ambustio..... 4
Hæmoptysis..... 1
Febris Irritativus..... 1
Diarrhœa Acuta.....12
Meningitis simplex..... 1
Asphyxia (drowning)..... 3
Peritonitis..... 1
Melæna..... 1
Hydrocephalus..... 1
Febris Remittens..... 8
Cerebritis 5
Scald..... 1
Congestio Abdominalis.... 4
Syphilis Hereditaris..... 2
Paralysis..... 3
Exhaustio..... 1
Tetanus 4
Marasmus..... ...20
Dysenteria 8
Cholera Infantum..... 7
Spasmus 11
Enteritis..... 5
Congestis Medullæ Spinalis 1
Phthisis Pulmonalis.... 45
Abortus 13
Febris Cerebro-spinalis.....35
Febris Congestivus..... 9
Tabes Mesenterica..... 2
Bronchitis..... 7
Pneumonia 21
Laryngismus Stridulus.. . 1
Pericarditis..... 1
Ramollisment Cerebri..... 1
Hæmatemesis..... 1
Meningitis Tuberculosa.... 2
Hepatitis 1
Abscessus Hepatis..... 1
Hæmorrhagia Post-partum 2
Scarlatina Anginosa..... 1
Dysinteria Typhoides..... 1
Abscessus Cerebri..... 1
Dentitio.. 3
Febris Typhoides.....13
Colica Pictonum..... 2
Congestio Cerebri.....12
Natus Mortuus.....16
Senectus.....11
Hydrops 11
Fractura Cranii..... 3
Congestive Chills..... 7
Metritis..... 3
Pneumonia Typhoides.... 4
Febris Typho-malaria..... 2
Atelactasis Pulmonum.... 1
Delirium Tremens..... 1
Carditis Rheumatica..... 1
Febris Gastricus..... 2
Hydro-thorax..... 1
Epilepsia..... 1
Morbus Brightii..... 1
Dyspepsia Atonica..... .. 1
Congestio Pulmonum..... 1
Morbus Hepatis..... 1
Unknown.....83

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RECAPITULATION.

Total number as above	506
Whites	198
Blacks	306
Not stated	2

The mean mortality for twenty-nine (29) months was 17 13-29 per month. Of the 506 above given, 243 were under 10 years of age, or nearly one-half ($\frac{1}{2}$).

The number of deaths for each month is shown by the following tabular statement:

MONTH.	1871	1872	1873	Total
January	..	15	11	26
February	..	16	10	26
March	..	12	10	22
April	..	20	15	35
May	..	24	13	37
June	..	29	22	51
July	.	26	20	46
August	11	27	18	56
September	21	31	25	77
October	15	21	19	55
November	15	10	11	36
December	8	18	13	39
Total	70	249	187	506

DEATHS FROM PHTHISIS PULMONALIS.

Total number, 45 in 29 months.

Whites	15
White males	5
White females	10
Blacks	30
Black males	18
Black females	12

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AGES RANGE FROM 4 MONTHS TO 78 YEARS.

Mean of ages of both races..... ... .30 16-45 years.
" " " blacks..... .. ..34 15-29 "
" " " whites..... ..... 35 11-14 "

There were just twice as many deaths among the negroes as among the whites; and the mean of ages in this race is nearly two years lower than the white.

Mean annual ratio of deaths per 1000 of whole population 2.33
Mean annual ratio of deaths per 1000 of whites 1.44
" " " " " " blacks 2.88

The greatest number of deaths from this disease was in September, and next in October, March, April and July.

In the white race the largest mortality was among females; in the blacks there was a preponderance among the males. This may be due to the life of labor, exposure, intemperance, and neglect of sanitary precautions being greater in the males than the females of the black race, the latter leading a more in-door life as house servants, washerwomen, &c. In the white race the greater mortality among the females may be due to the debility resulting from maternity and lactation.

Our climate is too humid and malarious to be a good place of residence for consumptives.

Consumption gives us a greater number of deaths than any other disease, and I find by reference to the Annual Report of the Board of Health for 1872 that this is also true with regard to New Orleans; it is seen that for a period of six years, extending from 1867 to 1872, inclusive, this disease far outnumbers any one other cause of death, excepting the deaths from yellow fever in 1867 only, aggregating 4,308 in a population of about 200,000, and steadily increasing for the last five years. The ratio per 1,000 of population in New Orleans for the year 1872 was 3.84, as contrasted with the mean ratio of 2.33 in Selma for the same year; though it is doubtless true that many consumptives go to New Orleans from colder climates but to die; those in Selma originate here. This ratio of deaths contrasts very favorably with more

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Northern sections of the United States and Great Britain and the continent of Europe, as will be found by reference to page 785, and the following ones, in Aitkens' Science and Practice of Medicine by Clymer Vol. 2.

There is no doubt that this form of disease has increased in this country as in New Orleans since the war, and may be but one other result of the depressing influences, social and political, that affect us. I do not adopt the view advocated by Dr. Lawson that malaria has an antagonizing effect on pulmonary Phthisis.

DEATHS FROM DIPTHERIA.

Total number		13
White	11	
Black	2	
White females	6	
White males	5	
Black females	2	
Black males	0	

This would indicate that this disease is more common to the whites in the proportion of over 5 to 1; and more prevalent among the females than males of both races.

DEATHS FROM CEREBRO-SPINAL FEVER.

Total number		35
White	13	
Black	22	
White females	7	
White males	6	
Black females	10	
Black males	12	

This disease, the reverse of diptheria, is more fatal to the black race in the proportion of nearly 2 to 1; and about equally divided between the sexes, there being only an excess of 1 in favor of the males.

Ages range in the whites from 2 months to 30 years; in the blacks from 6 months to 40 years.

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DEATHS FROM MARASMUS.

Total number		20
White	7	
Black	13	
White males	5	
White females	2	
Black males	9	
Black females	4	

Over 2½ times as many males as females.

DEATHS FROM OLD AGE (SENECTUS).

Total number		11
White	7	
Black	4	
White females	5	
White males	2	
Black females	3	
Black males	1	

Thus giving us eight females and only three males; nearly three times as many females as males.

Ages range from 74 to 91 years.

TABULAR STATEMENT.

Sex.	Color.	Age	Nativity.
Female.	White.	74 years.	North Carolina.
"	"	75 "	" "
"	"	84 "	" "
"	"	79 "	South Carolina.
"	"	80 "	Virginia.
Male.	"	82 "	North Carolina.
"	"	84 "	Ireland.
Female.	Black.	80 "	Virginia.
"	"	90 "	"
"	"	91 "	North Carolina.
Male.	"	78 "	" "

The mean of ages as given above is 81.6 years.

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As marasmus carries off a larger portion of male infants than female, so the same greater constitutional vigor of females would seem to carry them to an older age than the males attain. How much the greater exposure to malaria on the part of the men in their early and late out-door business enters into this disparity is a question to solve. Alabama was only admitted as a State in 1820, and consequently the effect of the climate upon longevity is yet to be determined. Take the monthly average of mortality as shown by the above tables as 17.13, and for the year we have an average annual mortality of 209 in round numbers; thus giving us a mortality of 26.1 per 1,000 of our population. Of the 209 annual mortality the whites stand to the blacks as 198 to 306 in the whole mortality of 506, leaving out two whose color is not stated. This gives an annual average mortality among the whites of 81, and of the blacks of 126. The mortality per 1,000 of the white population (3,600) is thus stated at 22.1; per 1,000 of blacks (4,400) it is 28.7. Thus we have,—

Annual mortality.....	209
Rates of deaths per 1,000 of population,	26.1
" " " " whites....	22.1
" " " " blacks....	28.7

This, I submit, is a very good showing for Selma, and I believe the items on which it is based are as accurate as usual.

According to the Report of the Registrar General of England for 1872, "the mortality of London averaged 21 per 1,000 during the year." In different districts of the city it ranged from 15 to 29 per 1,000.

By the annual report of the Board of Health to the General Assembly of Louisiana for 1872, the ratio per 1,000 of deaths in New Orleans is stated at 31.98. No epidemic this year.

By the Fifth Annual Report of the State Board of Health of Massachusetts, the death rate of Boston for 1872, including small-pox, is stated at 30.43; that of 1873, at 28.74.

Notwithstanding our malarious surroundings, with a judicious expenditure of money and an enlightened compliance

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with hygienic laws, we could have a very healthy city. One of the prime factors, now wanting to this consummation, is an abundance of home-made and home-raised food, with a cheap-priced and abundant supply of fresh fish and oysters. It is a lamentable fact that nearly all the food we daily live on and raise our children upon is brought from other states, some times a great distance off, and must have greatly deteriorated by age, and thus become more or less unwholesome.

We mainly suffer from the various manifestations of malarial poisoning: congestive, bilious and intermittent fevers prevail; and occasionally some malarial hæmaturia (hæmorrhagic malarial fever). There are reported 26 deaths from congestive chills and congestive fever (17 and 9) and only 8 deaths from hæmaturia. The number of deaths from malarial diseases is small, as they are amenable to treatment; and though our citizens are under the influence of the malarial poison all the time to a greater or less degree, yet they but seldom, proportionately, die from its effects. Selma has never been visited by more than two epidemics—in 1853 the yellow fever prevailed, and in 1865 the small-pox. Both yellow fever and cholera have at different times prevailed near us but have not appeared here. The epizooty prevailed here in the winter of 1872 and was accompanied by an influenza among the people, which was very prevalent and characterized by great nervousness, prostration, neuralgia and dyspnœa, but was not at all fatal.

The Board of Health of Selma, composed exclusively of physicians elected annually by the Selma Medical Society, have exerted themselves to make the authorities and citizens comply with the laws of municipal hygiene, and have been seconded as far as they could expect probably by the city government and good citizens.

In 1873 a quarantine as rigid as we could make it was instituted against yellow fever infected ports, one of which was within 50 miles of us and connected by river and rail, and *post hoc* or *propter hoc*, the disease made no appearance.

I herewith submit an admirable weather chart for the three

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first months of this year, and beg that it be taken as a part of this report, in order to show more clearly our temperature, atmospheric pressure and humidity; with a short table of the mean thermometer and rain-fall for the year 1873. These were prepared by that intelligent and reliable observer, Col. C. Cadle, of Selma, who reports for the Smithsonian Institute.

TABLE NO. 1.

Months.	Mean Thermometer.	Rain Fall, Inches.
January	39.4	5.16
February	52.2	9.80
March	54.2	3.81
April	62.8	2.86
May	70.	7.41
June	79.	4.70
July	85.2	3.37
August	87.3	6.13
September	77.4	3.65
October	63.4	3.37
November	54.	2.43
December	49.9	2.28

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PYCNANTHEMUM LINIFOLIUM

BY E. M. VASSER, M. D., OF DALLAS COUNTY, ALABAMA.

Natural Order.—Labiatæ, or Mint-family.

Habitat.—Dallas County, Alabama.

Medical Properties.—Aromatic bitter tonic.

History.—My first acquaintance with the little plant was in the year 1854. I found it in the hands of negroes, tied up in bunches, occupying a position overhead in their cabins, with Monarda (horse-mint) and Gnaphalium Margaritaceum (life-everlasting). They assigned to it diaphoretic and emmenagogue properties. Since the war, I have been using it in cases of dyspepsia. I was informed by a freedwoman that it would quiet sick stomach; I therefore had the little plant hunted up and prepared. My patient was one of atonic dyspepsia, who had vomited immediately after eating, for ten years; from the first dose relief was obtained, and after a short time my patient could eat with impunity anything without going through the disagreeable ordeal of vomiting. The number of cases treated, I have not kept account of, though I have sent the plant to my friends and acquaintances throughout the country, who were suffering from indigestion, some of long and some of short duration, and I have yet to find the first case of atonic dyspepsia, without complication, that has not been benefited by it. I would call your especial attention to a dried specimen handed you herewith for inspection. To Dr. Charles Mohr, a German chemist and botanist, of Mobile, and to Dr. J. Parrish Stelle, the accomplished and intelligent agricultural editor of the *Mobile Register*, I am indebted for the classification and name. It was first described by Prush

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as belonging to the Labiatæ or Mint-family, and met with from New York to the central part of the Gulf States, on this side of the Mississippi, and in some localities known as the Virginia Thyme, or Mountain Mint. Like all plants of the same order, it contains a peculiar essential oil deposited in peculiar cells, which form the black spots scattered upon its leaves and stem, and to which its aromatic taste and slight odor is due; besides that it contains a bitter extractive substance analogous to that of the hoar-hound (marrubium) and Hysopus Officinalis. Dr. Mohr writes me that the plant has received no notice in the books upon our indigenous medical plants; but in Dr. King's Eclectic Dispensatory a number of species of the Pycnanthemum are named—one the Pycnanthemum Virginicum. This plant is very nearly allied to this, and only differs by its narrow leaves and smaller heads. I am satisfied that this species belongs to this region alone, and to Dallas county, near the Alabama river. Its maximum height is two and a half feet; it sprouts up in spring and dies down in winter; it grows in small clusters and is very difficult to distinguish from the other varieties that approximate and accompany it, except upon very close inspection or when in bloom; it is confined to wet sandy soil.

I have sent specimens of it, with packages to test, to learned botanists, to the publishers of *Tilden's Journal of Materia Medica*, and have received no reply, which satisfies me that the plant has either not been mentioned; that they can not classify it, or that it is confined to this region alone.

Dr. Mohr has proven clearly, to my mind, that it belongs to the mint-family, and to him I am under many obligations for his untiring exertions in searching for a name. I claim for it a place among the family of botanical remedial agents in atonic dyspepsia. Its action is directly upon the glands of the stomach causing them to pour out the gastric juice, at once necessary to chymification. In this condition, gentlemen, if you will allow me the expression, it is a *sine qua non*. During health the gastric juice is never present in an empty stomach; neither does the appetite depend upon contraction

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of the muscular fibres, for in a healthy condition it is always contracted itself; but in the atonic condition of the gastric glands, a stimulant and tonic, which is found in the Pycnanthemum Linifolium combined with whiskey or gin, has the desired effect.

Satisfied that this little plant would free the many sufferers from their discomforts and uneasy feelings and still allow them to indulge in those habits that generated the discomfort, I have given it a fair test in a number of cases and with the best results. So well satisfied am I that it is the remedy in atonic dyspepsia when the disease is confined to the gastric glands alone, that I ask for it a place among the family of indigenous plants, and as the remedy for dyspepsia exclaim, "Eureka".

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REPORT OF THE COMMITTEE ON THE CONTRACT SYSTEM.

The committee to whom you referred the subject of making medical contracts, have carefully considered the matter, in all the relations that presented themselves, and beg leave to make the following report:

They are of opinion that the whole system of contracts for medical services is radically wrong and injurious to the profession, and although custom seems to sanction the system under certain circumstances, yet still, it appears to the committee, that it is the duty of all organized medical bodies, as well as all individual members of the profession, to narrow the contract system within the closest possible limits.

The well known humanity of the medical profession need not here be alluded to. But while as a class and as individuals, we freely give our services to all whom poverty and destitution throw in our way, yet still it is our duty as men, living by our daily labor, to guard our material interests, and see that we are not imposed on by corporations or private persons not entitled to our time, our knowledge, and our charity. We know that if we do not take care of ourselves, no one is going to take care of us. There is a strong disposition on the part of the public, to treat individuals who are passive, in a very passive manner. When a man has not the courage to assert his rights people are sure to take advantage of him, and he is finally compelled to succumb to those whose strength of character is superior to his. Physicians should feel that their profession is not a trade to be made subservient to the whims of the multitude, and whenever encroachment is made upon their long established rights and usages, it is their duty, and it should be their pleasure, not to submit to officious dictation.

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Imbued with this idea, which it is not deemed necessary further to develop, we recommend the passage of the following resolutions:

Resolved, That it is the sense of this society that all contracts for doing the practice of clubs, corporations, and societies, are unprofessional—not in accordance with high medical ethics, and ought to be discountenanced by the profession, except under the following circumstances:

1st. When the contract is made with a regular hospital, jail, or other public institution, at a price adequate to the labor involved.

2d. When the contract is made with clubs, corporations, and societies, for the attendance on the poor members of the same, whom they pledge themselves to assist in sickness and destitution.

3d. It is the sense of this society that while all purely eleemosynary institutions should be attended for a comparatively small professional charge, yet the members of this society should, in common justice of brotherhood and general professional interest, make nice distinctions between charity which is real, and that which is only pretended.

Resolved further, That in the case of existing contracts, the society of course does not desire to interfere. But in the future, any member who renews a contract, not in the spirit of these resolutions, and whose professional conduct in this matter shall not be in harmony with them, shall be considered as deserving the censure of this society.

WM. H. ANDERSON,
G. OWEN,
D. E. SMITH,
Committee.

January 24, 1874.

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REPORT OF COMMITTEE ON A QUESTION OF MEDICAL ETHICS.

To the President of the Mobile Medical Society:

Your committee have carefully considered the ethical question submitted to them, and have to report as follows:

The question is this, namely—Whether it is justifiable in a regular physician, for the purpose of performing some special service, or of meeting some special emergency, surgical, obstetrical, or other, to visit any sick person under the care of a homœopathic or other irregular physician; it being understood that no formal consultation is held with said homœopathic or irregular physician, nor any recognition of professional fellowship extended to him? It is provided in sec. 1, art. IV, of the professional code of ethics, that no irregular practitioner can be considered a fit associate in consultation; but there is no express provision of the *code* applicable to the case here in question. Nevertheless, your commmittee are of the opinion that the true spirit of the ethics, and at the same time the true policy of the profession—and both with unmistakable emphasis—prohibit all regular physicians from allowing themselves to be made use of under the circumstances mentioned. Regular physicians cannot, properly, visit patients who are at the time under the care of homœopathic or irregular practitioners; and cannot, properly, leave patients in the hands of such practitioners after the performance of any medical, surgical, or obstetrical services.

When the homœopathic or irregular practitioner has been formally and permanently discharged from all further attendance on the case, then the way is open for the ministrations of the regular physician; but not until then. If to see the patient of a homœopathic or irregular practitioner is not a

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quasi consultation, it is at least to give him aid and countenance by helping him out of a difficulty—a sort of service which he has no right to expect at the hands of the regular profession. If it be urged that in such cases humanity requires of the physician that he should not refuse to a fellow creature the benefit of any knowledge or skill he may have, the reply is easy. The obligation of humanity is equally incumbent on the family and friends of the sick person. It is left with them to decide whose services they will have; and if they decline to put the irregular practitioner out of the way, whatever blame there may be attaches to them, and not to the regular physician who refuses to compromise his own dignity and the honor of his profession, by incongruous and unworthy associations. Holding these opinions, your committee respectfully recommend the adoption of the subjoined resolution:

Resolved, That the members of the Mobile Medical Society will refuse professional fellowship and recognition to all regular physicians who may extend any sort of professional service or advice to patients under the care of homœopathic or irregular practitioners—no such service or advice being allowable until the homœopathic or irregular physician has been discharged from all further attendance upon the case.

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A CASE OF OCCLUSION OF THE OS UTERI AT TERM,

Resulting in Delivery Through the Rectum.

BY GORONWY OWEN, M. D.

The patient in whom the occlusion of the os uteri occured, which I am about to describe, was a mulatto woman, delicate in appearance, though she says she has always enjoyed good health. She was married in 1863, at the age of twenty-three, and had one child, which died soon after its birth, since which time she has lost flesh, and had some pain at each menstrual period, yet not sufficient to interfere with her household duties.

She was induced to accompany a lady in the capacity of a nurse, in October, 1869, to Washington City, where she remained until October, 1870, when she returned to her husband at Mobile, much improved in flesh and appearance. She menstruated in October without pain, and again in November, the function being in every respect normal. On the 25th day of December, 1870, the time at which the catamenial flow should again have appeared, she was seized with an intense pelvic pain, evidently uterine, for the relief of which I was called in. I found her in great agony—without fever or any other symptom of inflammation. Opiates were prescribed freely, and after three or four days the pain subsided without the establishment of the menstrual flow. No vaginal examination was made as the opinion was entertained that conception had taken place and that the pains were only threatnings of an abortion, which I believe was successfully resisted by the prompt and free administration of opium. From this time onward my patient presented the usual signs of pregnancy.

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She was not sick, but gradually emaciated until the 20th of August, 1871. When labor commenced a colored midwife was sent for, who remained in attendance two days, and the labor not advancing satisfactorily, I was requested to visit the patient with the view of effecting an instrumental delivery. Upon entering the room the bearing down pains induced the belief that labor had advanced to the second stage. Upon a vaginal examination the head was found upon the perineum. The presentation and position accurately made out, and it was thought that delivery was only prevented by a tough bag of waters.

A farther re-examination, however, undeceived me, and revealed the true nature of the difficulty, as it became only too evident that what I had at first supposed was a dense membrane was in reality the attenuated wall of the vaginal portion of the uterus, upon which, after a most careful search, no os was found. The facts of the case were now related to my partner, Dr. Gaines, who visited the patient with me and after a careful examination, fully concurred with my opinion.

The case being a rare one and of much interest, Dr. Webb, an old and experienced obstetrican, was invited to visit the patient with us, and he too failed to find anything like an os uteri. Being aware of the rule to operate when after a thorough digital and instrumental examination had been made and no os found, Dr. Gilmore (a surgeon) was called in consultation. He, with Sims' speculum, brought into view the entire vaginal portion of the uterus, and upon the anterior part a depression or dimple was found, with œdematous edges, or lips. This we inferred was the original location of the os, and here we decided to make an opening, which was easily done. No hæmorrhage followed the incision, but immediately dilatation resulted to extent of $1\frac{1}{2}$ inches, through which we could feel the child's head covered with the amnion, thus encouraging the hope that the completion of the delivery could now be safely left to nature's efforts; but no progress being made for some time, it was thought proper to stimulate uterine action by ergot, which was accordingly given without avail,

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as the patient went to sleep and slept gently until the next morning, then all uterine action had ceased. Still it was thought that the contraction would again recur, and of course no interference was attempted. To our great surprise the absence of uterine action continued until the next month—an interval of twenty-eight days—the period, perhaps, of the most regular menstrual discharge. At this time pains set in as in natural labor, just as they did in the first instance, though not so strong as before, nor did they make any perceptible impression on the os, as it maintained its former dilatation. Every endeavor was now made to induce the patient to permit us to use an artificial dilatation but to no purpose. She and her friends positively opposed any kind of assistance.

The contractions again diminished in strength and finally ceased altogether as before.

Our patient now passed another month of comparative comfort, feeling all the while the motions of the fœtus; finally, however, she began to suffer pain as before, which after two or three days passed off, as was the case on the two previous occasions.

After the third month the patient did not feel the fœtus move, nor could the sounds of the fœtal heart be detected, and it soon became evident that the uterus was getting smaller, the patient felt lighter and was able to attend to her daily duties, and naturally enough felt convinced that her doctors had made a great mistake. Yet upon a vaginal examination, the presentation and position could still be easily made out, and the patient and her friends were informed that there was a child in the womb and that it was dead, and that sooner or later she would be compelled to have it extracted, and that to delay the operation would only increase the danger as the opening in the womb was gradually diminishing and would certainly close up again. This appeal to her fears was futile as she was conscious of daily improvement in her general health. This fact, with her want of confidence in our opinion, made her strong in the belief that no harm could result from

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a cause which she and all her friends felt convinced did not exist.

As time passed the conviction of the truth of her opinion was strengthened, for she was well enough to walk about the city without inconvenience, and her size—from the absorption of lyquor amnii and shriveling of the fœtus—had diminished so much as not to attract attention. The outline of the child's body could still be made out through the abdomen and the head could be be felt as distinctly as at any previous examination through the vagina.

This condition continued until July, 1873, when, after a long walk of 3½ miles in the country and back, she had a chill followed by fever, which lasted for nine days, and though very sick she did not complain of any uneasiness in the uterus, nor did pressure upon the abdomen or through the vagina cause any. At first it was doubtful whether the fever was caused by the encased child or was malarial, as she lived in a miasmatic district. In a week from the cessation of the fever, she had another chill, followed by fever, which continued to recur at irregular intervals, attended now with a sense of heat in the pelvis and with considerable rectal trouble. An examination was now made (both digital and instrumental) and it was found that the bones of the cranium were separated and that the incision which Dr. Gilmore made had nearly closed; in fact, I was unable to pass Emmet's uterine probe more than ½ inch into the cervix, which was now much thickened by the results of inflammation.

The condition of my patient was now deplorable, and I again endeavored to persuade her to submit to an operation as the only possible chance for relief to her suffering, telling her no cutting would be required as I thought I could, by using sponge-tents, effect sufficient dilatation. Drs. Fournier and Moses were now called in, and after careful examinations warned the patient that if she persistently refused all assistance she would or must die; to which she answered that her friends were unwilling, and that she would have to die. Her agony was now beyond description. She emaciated rapidly,

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and had an offensive muco-purulent discharge from the rectum, attended with a constant bearing down effort. A rectal examination proved that an angle of one of the cranium bones had perforated the walls of the uterus and rectum; but as my patient still obstinately refused to allow any interference I became discouraged and prescribed opium to relieve her pain and abandoned her case, expecting every day to hear of her death. After a lapse of three weeks, however, she sent for me, stating that her suffering was intolerable and that I might do what I pleased. An examination satisfied me that the entire fœtus could be extracted through the rectum, as one of the cranial bones was in the rectum, immediately over the anus, acting as a valve, effectually preventing defecation. On the 29th of October I called upon Dr. Gilmore, and informed him that our patient was willing for us to deliver her in any way that we thought proper, provided we would give her chloroform, which in her condition was regarded as extremely hazardous, as she was literally skin and bones, with hardly a pulse at the wrist. It was thought that she would die under the operation, but it was her only chance and we determined to give it to her. As a precaution brandy was given liberally and the chloroform administered. The pulse if anything improved under their joint influence, and we found that the great relaxation from long and extreme emaciation and from the chloroform, permitted us to dilate the anus to almost any extent, and without the least difficulty, to extract the fœtal mass. The greater part of which—the cranial bones, and those of the upper extremities and the upper part of the body—was in the rectum. The pelvis, with the viscera, which were a putrifying mass, and bones of the lower extremities, was still in the uterus; all, however, were promptly extracted; and the uterus firmly contracted upon the hand as it was withdrawn, and of course no hemorrhage followed. After the completion of the extraction the patient did not seem any weaker than before it was undertaken, though her feet and hands were cold and clammy. Every effort to bring about reaction, by external heat and stimulants,

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was resorted to, and after a doubtful period of a week our patient began slowly to convalesce and to relish food; and notwithstanding she had a purulent discharge from the rectum for some time afterward, her improvement was steady, and in a month she was able to walk about the room. By the 17th of February she had regained her flesh and was in every respect well; indeed, she menstruated freely and without the least pain. In March she menstruated again without the least discomfort. Being of course much perplexed, I prevailed upon the patient to allow me to make an examination with the view of ascertaining the condition of the parts after recovery, which was, in every sense of the word, complete. I found by a rectal examination that the fistulous opening into the rectum had healed without any stricture or contraction.

Upon a vaginal examination, the cervix uteri was of normal length, perfectly movable and of a healthy pink color; and the os, which before the extraction, from inflammatory enlargements and induration, would not admit a probe, now readily permitted the passage of Simpson's uterine sound.

In conclusion, I may state that the fœtal specimen is preserved in the museum of the Alabama Medical College.

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ASPERGILLUS NIGRICANS.

BY W. D. BIZZELL, M. D., OF MOBILE.

At the regular meeting of the Sumter County Medical Society, held in Livingston, November, 1873, I called the attention of the members to this rather rare affection, by reporting a case occurring in my own person, and from which I was still suffering at time of the report.

At the meeting of the State Medical Association, held in Selma, I was, on motion of Dr. Webb of Sumter, requested to furnish a report of the case for publication in the present volume of the transactions.

About the first of October my attention was attracted to my ears by an occasional itching sensation, not, however, very troublesome; the meatus being dry and scaly and the ear almost devoid of the normal cerumen. It was not, however, till about the 14th of November that the affection could in any way have been said to be troublesome. On that night, after an exposure all day to the influence of a cold damp wind, at the time prevailing, I perceived a very uncomfortable feeling in both ears, as though they had been stuffed up, and accompanied by a twisting boring sensation, as though a stick or some substance was being thrust into the meatus, and the secretion from the ear, which had been augmenting for some ten days, and the itching, more intense, had now come to be a most annoying pain, which was not allayed by oils, laudanum, &c., instilled during the night of the 14th, and on the morning of the 15th, I thrust an ear-scoop cautiously into the auditory canal, and to my surprise found the canal filled to impaction with a pultaceous cheesy mass,

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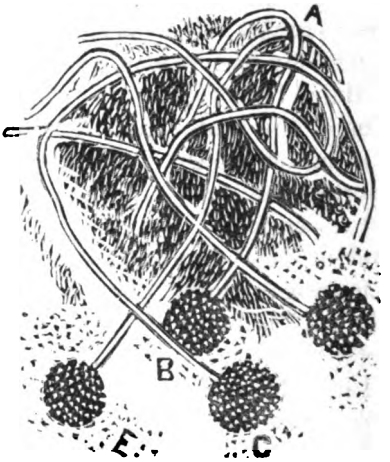
resembling very much in its appearance half melted tallow,—the same sort that for some days I had brought away on the little finger inserted to allay the itching. After the removal of a very large amount of this substance there was complete relief to all the painful symptoms. On a close inspection of a portion of the mass removed, it was observed to be thickly dotted with little black points as though strewn with minute particles of soot. Immediately suspecting some disease a small portion of the mass examined under 250 diameters clearly revealed its character, as shown in the plate subjoined.



ASPERGILLUS NIGRICANS.

X 250 diameters.

A. Mycelium.
C. Sporangium.
B. Fruit bearing stems.
E. Spores.

The white mass consisting, for the most part, of the intricate network, mycelium (A), rootstalks or stems of the fungus, imbedded in the vitiated cerumen, and springing from which are the straighter fruit bearing stems (B), crowned by the rounded black sporangia (C), which immediately pronounce it to be the Aspergillus Nigricans.

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Dr. St. John Roosa, American Journal, January, 1870, in connection with the report of two cases of this parasitic affection in the same locality, gives a very complete history of the disease, and also in his late work on diseases of the ear. He says that—"It is not more than six years since the profession generally became aware of the fact that vegetable fungi were germinated in the auditory canal, and that they caused or agravated inflammations of this part of the surface of the membrana tympani."

Schwartz, in 1867, first called the attention of the profession prominently to this disease; since then a number of cases have been reported, both in this country and in Europe, so that the affection is one now well recognized by the profession. Roosa says—"The disease which usually preceeds the formation of a vegetable fungus in the ear, is usually, as I believe, an eczema. The etiology of their affection, however, is not quite clear, but I feel quite certain that I have not seen a case of the growth of the vegetable fungus in which the ear was sound before the growth occurred. Some kind of an inflammation which loosens the epidermis has first occurred."

The fungus is really a mould—such as is found on damp walls, bread, or old shoes—that found on the latter—the aspergillus—in some of its varied species being the one most commonly met with.

Symptoms of this affection are those of inspisated cerumen, tinitus aurium, deafness and pain, the latter symptom being more marked, however, in the fungus disease than in cases of impacted cerumen, that of the fungus growth being of a dull heavy character, with an occasional twinge of a piercing or boring character, Roosa says, and such was my experience of the disease in my own person. A careful removal of the growth gave me complete relief, which was only of short duration, however, six or eight hours being sufficient for the reproduction of an appreciable amount of the growth, and twenty-four hours for its complete reproduction, depending however, to a considerable extent on the degree of

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the inflammation, the greater the phlogosis the more rapid and more abundant the growth and the quicker its reproduction; and as this varied at different times, the time of its reproduction would vary. After careful attention for a few days had somewhat subdued the inflammation, forty-eight hours could be passed without any especial inconvenience or appearance of the fungus.

In diagnosis, the microscope alone can give positive evidence of the presence of the fungus, though the peculiar dull heavy pain in the ear coming on rather suddenly after a prolonged irritation or chronically inflamed state of the canal, accompanied by this white cheesy secretion closely adherent to its walls, and in the case of the aspergillus nigricans, thickly strewn with black points, would lead us to suspect the fungus.

TREATMENT.

I would remark in the first place, that any treatment so far as the experience of my own case goes, to be successful must be persevered in for a considerable time, even after the fungus has ceased to put in an appearance.

Three or four times thinking myself cured, I stopped medication only to be disgusted by the reappearance of the malady in the course of a week or ten days.

I also remarked that any prescription containing glycerine seemed in my case only to aggravate the disease.

Dr. Roosa recommends the cheesy-membrainaceous fungus lining the reddened and sensitive canal, to be removed by the angular forceps, the meatus being well dilated and illuminated by the speculum or otoscope, as he truly says, "no amount of syringing being adequate to its removal."

I was accustomed to remove it from my own ears by a delicate probe wound with cotton and moistened with glycerine, gently inserting and twisting it round till the whole of the growth was removed. After the growth has once been thoroughly removed, the great desideratum is to keep the ear cleansed properly to prevent the reappearance of the growth

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and remove, as far as possible, all the spores of the fungus. This I know from several months experience cannot be effected with sufficient thoroughness by the use of any sort of syringe, but requires the use of some kind of a douche, which can, however, be improvised in the shape of a piece of india-rubber tubing, of small size and about four feet in length, into one end of which is screwed the smallest nozzle of Davidson's syringe, the other end inserted into a vessel containing about a half gallon of tepid water, and placed at about three feet elevation, the water is allowed to flow through the nozzle inserted into the ear till near a quart passes each ear. It was under this kind of treatment that the disease was finally subdued.

PARASITICIDES.

A number of the so-called parasiticides were tried conjointly with use of the syringe; no benefit, or at least only of a transient character followed their use.

After the treatment by the douche once or twice a day was inaugurated, equal parts of water and Fowler's solution were used, and I am inclined to attribute the cure, in part at least, to it, at least in the way of subduing and altering the character of the inflammation in the walls of the canal.

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THERMAL WATERS.

BY A. L. GARNETT, M. D.

While disclaiming any intention of dictating a line of thought to this learned assembly—comprising so large a number of the most scientific and distinguished gentlemen of the medical profession of the State of Alabama—I hope that I may be pardoned for claiming their attention to a brief discussion of thermal waters, and their value to the race of man.

Having a greater personal familiarity with the Hot Springs of Arkansas, than with any other springs, and their renown and temperature being greater than any other east of the Rocky Mountains, my observations will be based upon the knowledge acquired, chiefly, through them.

The great importance which mineral waters have attained in the treatment of diseases within this century, has induced me to investigate, with scrutiny, their action and the reason for it. The great faith which the laity have in their virtues, stands out in bold relief when contrasted with the indifference shown by the majority of the members of the medical profession. It has been customary for medical men to levy upon every element—I use the word in its popular sense—which can be utilized in the treatment of man's infirmities; and, yet, there seems to be, always, an undue leaning to the products of the pharmaceutist, to the exclusion of other agents, equally as important. The most accomplished chemists after having worn out their brains in the duties of the laboratory, are compelled to confess their inability to cope with nature, their all-powerful competitor. The highest re-

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ported achievement of the chemist's art, is too often but the poorest counterfeit of nature's gifts; and the very uncertain results frequently attending the progress of chemical knowledge, should cause a high valuation to be placed on any agent which, although its active property be not discovered, is useful in the amelioration of those diseases to which flesh is heir. In the great *humanitarian* purposes of the medical profession, successful results must be the crucial test by which the value of remedies is judged. These reflections naturally suggest the question: in what consists the remedial value of thermal springs? I am compelled, by candor, to confess my inability to answer, satisfactorily, this enquiry so frequently made, although I have formed a theory of my own on the subject, or, perhaps, it would be more exact to say that I have adopted, with modifications, some of the many theories already advanced. A careful examination of the waters has not revealed the source of their virtues. Chemical analysis does not show the presence of a single salt or gas, which might not be manufactured, and which is not prescribed in some form, by physicians throughout the country. The imitation of natural mineral waters is often effected by the aid of science, but while the solid and gaseous matters which have been *discovered* are supplied, there seems to be, always, some quality wanting, which lessens their alterative and curative value, and their hold upon popular faith. It may be that a subtile element lurks in the laboratory of nature, which is too tenuous and delicate for any known chemical test, and upon it depend the potential activities manifested by the heated fountains. When the mind reverts to the very recent discoveries of iodine and bromine, and their wonderful influence in therapeutics is contemplated, it is hardly speculative to reach this conclusion by inductive reasoning. The *speculation* that "Hot Springs" flow from ancient lagoons, situated within the earth's crust, which were formed when the earth possessed greater vitalities—in the days of Cryptogamous plants and huge reptiles—while it has attracted the fancy of the visiona-

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ry, and given a plausible solution to many difficult problems, has failed to satisfy the scientific investigator.

Too frequently physicians are attracted by some one property, and are disposed to reject all others in their search after remedial agents. This is shown in the different theories upon the value of Hot Springs; some selecting one quality, whilst others select another, thus failing to attribute to diverse constituents, their several values.

In my investigations, I have tried to avoid this error, and to count at its true worth every known property.

In experiments made with mineral waters of different temperatures, the magnetic needle showed great deviations, thus indicating the presence of currents of electricity. It is conceded that waters terrestrially heated are charged with a larger quantity of electricity than those whose temperature has been artificially raised, and upon this fact I, in part, base the curative value of thermal waters. Hot water, in its route to the surface of the earth, must obtain large quantities of electricity from the currents which are constantly passing through the superficial parts of the globe, which it stores up in its molecules, as a patent remedy in the cure of disease. The current set up between the body of the invalid and the hot water of the bath awakens new energies, and arouses vitalities which had ceased to do battle in the struggle for existence. When the galvanic battery is used, the current established by it is often too active, too violent, the momentary reaction being followed by a corresponding depression, which leaves the system more weakened and prostrate than it was previous to the shock. But in applying electricity to the entire body through the medium of the bath, the nervous filaments, both of the cerebro-spinal and of the sympathetic nervous systems are stimulated, and acting upon the different organs and bloodvessels, enable them to perform, anew, their important functions. The near kinship existing between life and electricity—the belief having been entertained, formerly, by many that they were identical—makes it difficult to ignore its presence, and to count as valueless its agency in the me-

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tamorphoses wrought by thermal baths. Most writers, on thermal springs, believe that their chief value depends upon *temperature*, and I am strongly disposed to endorse, with certain reservations, their opinion. It is difficult, however, to separate the part played by the imponderables, heat, electricity, and magnetism, since they are "equivalent to each other, just as carbon, zinc, and oxygen are. By a certain measure of electricity we produce a corresponding of heat or of magnetic power, equivalent to each other and to the electricity producing them; we purchase that electricity with chemical affinity, which in one shape produces heat, in another electricity or magnetism." It is a question with me, whether their efficacy is due to the temperature indicated by the *thermometer*, or to an *allotropic* condition of heat, like ozone is of oxygen. I cannot believe that the great caldron of nature possesses no power of imparting qualities to them, not contained by waters which are artificially heated, and that when the discoveries of science shall be greater, there will not be found properties ponderable or imponderable, to which their benefits may be ascribed. Natural philosophy demonstrates that when two bodies of different temperatures are brought into contact or proximity, the one having the higher temperature will lose heat, while the one with the lower temperature will gain it. Now it is, by the operation of this law, that the invalid whose temperature is less than the standard of health requires, gains heat from the hot bath, and stores it away in his tissues to aid in the economies of life, as oxygen, in large quantities is stored up by the muscles during sleep to supply the working body.

It is customary for physiologists to experiment largely with the lower forms of the animal kingdom, in their investigations into the causes regulating the functions of the higher types of animals, and I cannot do better, in illustrating the value of heat, than by drawing upon the same source.

Well known experiments have shown that infusoria live through the winter beneath the ice (*vid.* Ehrenberg) in a

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semi-frozen state, and revive upon the melting of the ice in the spring.

And rising in the scale of animal life, it is shown that articulata go into the chysalis stage in the winter, and that they remain in a partially congealed condition till resuscitated by an elevation of their temperature. Spallanzani ascertained that the lower forms of animal could be kept 20° F. below zero, and revived by heat. Other experimenters have observed the reviving agency of heat upon partially frozen Batrachians, which, after being subjected to the rigors of the arctic blasts of winter, were restored by the warmth of summer. In these experiments it is shown that heat brings back the thralled life from its frozen embrace and restores its lost activities. May we not, then, add life as an equivalent of any one of the imponderables, heat, electricity and magnetism, and that under *certain conditions* they become convertible, the one into the other? Magnetism producing electricity, electricity producing heat, and heat producing life.

It is proved by experiment that the heat of the body is raised several degrees by the hot bath, and since there is *no depression* following the use of thermal baths—I use the word thermal as indicating terrestrial heat, in contradiction to artificial heat—I am brought to the conviction that there must be some property present, not resident in water differently heated, that it is a new manifestation of heat, not yet observed, which produces such beneficial changes in the organism of the invalid.

The value of thermal waters may be also attributed to the aid which the baths render in the elimination of mineral medicines from the system; thus enabling the patient to use more freely such remedies, without danger of their permanent retention in the body.

These cursory views have been presented with some hesitation and diffidence, and it has been my desire rather to give prominence to the subject discussed, than to attempt an interpretation of the phenomena investigated. The medical profession is not a unit upon the property or properties which

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give efficacy to thermal waters, but it is upon the class of diseases for which they are remedial. The unanimity of sentiment existing between the physicians of the new and old world, relieves their vaunted value from the shadow of suspicion, and should stimulate the student of nature to new efforts in discovering the cause of their mysterious influence. There must be a solution to this problem, since effects are produced by adequate causes, and in this case, the causes are as determinate as the laws of attraction, which keep the planets in their orbits; and the explanation of these causes imposes upon the medical profession a duty of grave importance.

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JACKSON COUNTY DISEASES.

BY J. S. BANKSON, M. D.

Malarial Fevers with most other diseases common or prevalent in the State, except yellow fever, cholera and malarial hæmaturia, or hæmorrhagic malarial fever if you will. The treatment pursued by most physicians is mercury, and about such as had been adopted twenty-five or thirty years ago. They appear not to want any better and give into the idea that fever must run a definite course and can not be cut short by the best treatment. I will report but a few out of hundreds that I could report, I suppose.

CASE FIRST.

C. Cross was visited by Dr. G— (I attended with him) about 8, P. M.; found the patient going into a collapse; extremities cold; vomiting anything swallowed; body very hot; a corpulant man, and had a great deal of heat.

TREATMENT.

Thoroughly wet his head and body with cold water, which was continued four or five hours as soon as the skin became dry till the fever subsided, with a dose of calomel, 15 or 20 grs., at 11, P. M. Next morning fever was gone; feet and hands warm. He could take quinine, or anything else. His calomel acted, and he recovered without further trouble.

CASE SECOND.

Mrs. C—, sister of the above, corpulent; similarly affected;

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had what they called a congestive chill in the forenoon. I saw her about 2 o'clock next morning; pulse 120; fever very high, and vomiting.

TREATMENT.

Saturated her clothing with cold water, head also wet, which was kept up till fever subsided; about 6, A. M., gave quinine, as usual, and she recovered without any more attention.

CASE THIRD.

Wm. C— had bilious remittent fever; had been under treatment three or four days (the old dry treatment), and was going into a typhoid condition, and his father, a physician (T. T. C—), expressed an uneasiness for him; considered him dangerous, and requested me to see him. At dark found his pulse 100 and tongue coated some and too red.

TREATMENT.

Profusely sponged his body (wet head also), gave some spts. nitre, and continued the bathing as soon as surface became dry while any fever remained; pulse reduced 17 beats in about an hour. Next morning saw him again; he took quinine, had no more fever, and was going around in two or three days.

CASE FOURTH.

A remarkable one. Mrs. M— had bilious remittent fever for three or four days, and on Sunday was delivered of a child, prematurely (being born dead); went on to congestion of the brain and coma Sunday evening, which continued till Tuesday, when I visited her at noon; found her lying partly on her right side; head drawn slightly back; mouth open; eyes closed; pulse 120, as well as recollected, and full; could not be aroused to notice any thing; her body was very hot, and she was considered by those present to be in a hopeless condition.

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TREATMENT.

Bled her slightly from the arm which produced no change, perceptible; put a small blister to the nucha; bathed her head with cold water (did not pour it on, but wet it in a sponging manner); water warmer, about 90° perhaps, or a little more, applied gently, as above, by a wet cloth to her whole body and continued in that way, by cooling the water some, all afternoon and night while there was any fever remaining as soon as the skin would became dry. She gradually became conscious, and in about three days was perfectly rational; took cathartics and quinine and recovered.

I use water in fevers from any cause, and think the practice equal to or superior to any on record—small-pox, scarlatina, pneumonia, laryingitis, croup, dysentery, and the medicines as auxillaries generally, but frequently they are feeble ones.

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ANNUAL ORATION.

BY S. D. SEELYE, M. D., OF MONTGOMERY.

Cell-Life the Basis of all Force, both Mental and Physical.

MR. PRESIDENT, LADIES AND GENTLEMEN:—In fixing upon a theme for this evening, a variety of subjects presented themselves to my mind, any one of which might have been made interesting to an audience like this, composed of ladies and gentlemen of intelligence, culture and refinement.

But to interest you is not my only aim. I desire also to instruct and aid you, and have done violence to my own preference—which would, perhaps, have enabled me to give you a more pleasing address—that I might meet what seems to me a great want in the civilization of the age, and particularly in our own country, warn you of certain evils, and instruct you in some great, yet simple, physiological principles that will enable you to shun them.

These evils are incident to an advanced stage of enlightenment, and gather force from the eager, active spirit which rules all our efforts.

I shall not indulge in a tirade against the age and sigh for the good old times; for as I compare the present with the past, I feel that these are the best and the oldest times, and present to us as the prerogative of age, the fruit of all the experience of the past, of successes and failures in thought and action.

The spirit of the age is aggressive.

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Intellect is reaching out in every direction, piercing to the uttermost verge of human thought, and striving in many ways to solve the great problem: "WHAT IS TRUTH".

Neglecting the sublime announcement of God himself in the burning bush: "I AM THAT I AM; say unto the children of Israel, I AM hath sent me;" and of the Divine Redeemer in life and precept: "God is love," men wander wide and grope in darkness, feeling after Him in his laws—many of them earnest souls, religiously seeking truth by the taper of pure reason; others in the arrogant assertion of intellectual pride, refusing to believe in God, unless He is revealed to them after their own conceptions of Him; forgetting that "to comprehend God they must be God".

Science strikes hands with philosophy in the eager search for the *ultimate principles* and laws of the universe.

Mechanic arts push forth in all directions, embodying laws which have lain perdu since time was, and which have sprung up to the gaze of the eager seeker in this age, startling, and yet so simple that the wonder is we have not always known them.

The microscope assists our vision in the ultimate analysis of law and design throughout the range of Gods fair creation around us; the telescope brings within our ken new reaches of beauty and sublimity in the worlds which people infinite space; and the spectroscope goes hand in hand with it, determining even the chemical constituents of the heavenly bodies.

While the heart of Israel's bard and king swelled within him and burst forth in ecstatic song at thought of all the beauties and perfections of God's creation, the devout philosopher of the present day strikes a higher note of rapture and praise; as besides all that David saw, he has revealed to him the *hidden laws*, and perfection of design of the Great Creator.

In every department of the economy of life, the slow and even tread of the fathers is put to the blush, by the eager,

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strained, *overstrained*, outreaching activities of the present age.

Social life (perhaps better society-life) catches the breathless pace.

Even the home, which should be the sanctuary of rest, and happiness, and growth, feels too, the swift rushing wings of the spirit of the age.

To a certain extent this is right. It is right that gathering up the lore of the ages, we should make a stride in advance. It is reasonable that from the history of failures, and successes of the past, we should select the best, or mark out new paths guided by its light.

It would be censurable did we not, having all past science as a foothold, conquer our way still deeper into her arcana.

But are we doing this wisely? Are we, of this generation, doing the best that can be done? Nay, are we not in all these things, the thought of which stirs the blood to freer currents, and makes the heart to swell, entailing upon ourselves and our successors some compensating evils? Evils which loom up in alarming proportions, carrying misery and woe in their train.

The answer must be an *emphatic affirmative.*

Whence the vast augmentation of mental diseases which makes the asylum a necessary part of state economy, and peoples it constantly to its utmost capacity?

Whence the necessity of eleemosynary institutions of various kinds, unknown to the fathers, because the diseases for which they are provided, were of rare occurrence?

Whence the sad sight which so often meets our eyes, and saddens our hearts, of men and women who should still be in their prime of usefulness and vigor, broken down midway in life's journey, and compelled to linger through a miserable and aimless existence?

Why is the average of human life dwindled down from three score years and ten, to less than two score years?

It is because in the ambitions of life; the attrition of mind against mind; the eager, outreaching activities of the age,—

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this wonderful machine, the human body, wears out too rapidly, and we take too little time for repairs.

Upon this answer hinges my message to you to-night.

In developing my theme, I must beg your attention to certain physiological principles and details, regarding the source of all powers of mind and body, which will be embodied in the theory of CELL-LIFE.

A general statement of the proposition is—that for every action of mind or body, certain changes occur in the molecular atoms which we term CELLS, and which form the basis of organization for the whole body. This change is one of waste or wearing out, and to keep the physical economy in good condition, repair must keep pace with it.*

Unity of design marks the entire work of the creator, throughout the whole range of organic life.

In the vegetable world, from the simplest fungus, or the most insignificant plant upon which we tread, to the giant tree which lifts its head defiantly to the powers of wind and storm; and in the animal world, from the simplest animalculæ which disport themselves by thousands in a drop of stagnant water, to man, the highest development of the creative power of the Almighty, of which we know anything; one mode of growth, and one mode of development, underlies them all.

The first conception of organic life, vegetable or animal, is the SIMPLE NUCLEATED CELL, called also the PRIMORDIAL CELL.

In the vegetable world, the simplest form of organization consists of a single cell. It absorbs its nutriment from the earth, air, or water; grows and develops, and propagates itself.

In the higher grades of vegetable life, the cell takes on additional functions. The respiration of the plant through its leaves, the circulation of the sap, the entire cycle of growth,

* (*I must beg the reader to understand that I purposely refrain from attempting to follow the extreme scientists of the day into the realms of protoplasm, bioplasm, etc., inasmuch as the address was prepared for a popular audience and to arrest their attention and impress the lesson which I would teach, it seemed necessary to keep within such bounds as to enable me to be fully understood in the short space allowed in a single lecture to a mixed audience.*)

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maturity and decay, is carried on through the active processes of CELL-LIFE.

The transformation of inorganic chemical constituents into organic vegetable matter, in all its various forms, of woody fibre, leaf, blossom, fruit and seed, is performed by these little individual molecules.

Each cell has its special part to perform, and is endowed with a certain *vital element* which eludes all analysis, and which keeps up its individuality.

Under the microscope, the cells of many different plants will be found so nearly alike, that even by the aid of the highest magnifying power we can perceive no difference in them; and yet each one can only propagate its kind, or appropriate to its nutrition and growth, only the elements which constitute the plant to which it belongs.

This is fully shown in grafting. Engraft a dozen different kinds of roses into one bush, and each graft will produce only its kind, while the parent bush retains its original qualities in all respects. Graft the pear upon the quince, and you have still the pear. And so throughout all the varying changes to which you may subject organic vegetable life; each cell of each species, can only propagate its kind, or appropriate to itself, from the materials of growth furnished by the sap, just the elements needed by that species; and of these elements, a leaf-cell can only appropriate material for the growth and functions of the leaf; a ligneous cell can only minister to the formation and growth of woody fibre; and so of each constituent of a plant; its cells, upon which its growth and functions depend, can only minister to itself and propagate its kind.

In the animal department of organic life, we find the same underlying principle of CELL-LIFE.

In the lowest type, a single cell forms the being. A little higher, we find them to consist of a mass of cells, without definite organs. Higher still, this mass of cells is organized into definite shapes, with definite functions; and as we rise in the scale, we find one organ after another added, until in

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man we find complex and perfect organs for every function. And yet in man, with all his complexity, the basis of organization is the primordial cell, and the source of all power lies in the active working of these little molecules.

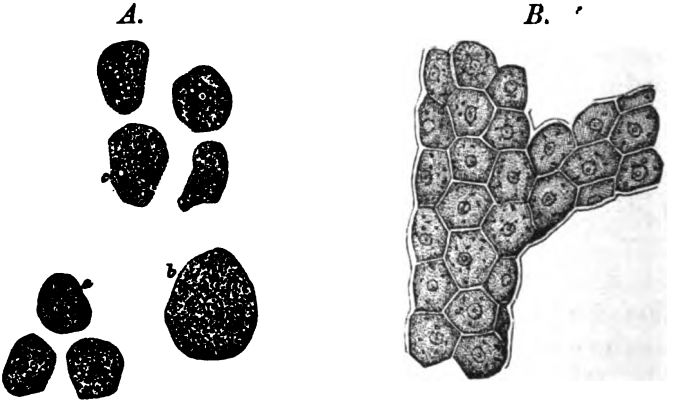
This is one of the wonderful developments of this age, and opens to us an entrance into nature's hitherto hidden mysteries.

Solomon, in his wisdom, studied and "wrote of all plants, from the cedar to the hysop, which springeth out of the wall; he spake also of the beasts, and of fowl, and of creeping things, and of fishes;" but Solomon had no conception of the simple, yet beautiful, law of divine workmanship, which, by the aid of the microscope, has been revealed to this age.

Before going further into this theory of CELL-LIFE, let me call your attention to the following diagrams; that you may be enabled more clearly to understand what we mean by CELLS.

They are only visible by the aid of the microscope, and seen thus, they are of various shapes and sizes; and are generally described as consisting of cell-wall, intercellular-substance, and nucleus. Within the nucleus is also another small point, not always present, called the nucleolus.

FIG. 1.



I show you first at Fig. 1 A, a representation of the Secreting Cells of the Human Liver.

a and *b* are isolated cells, viewed by different magnifying

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power. A moment's study will enable you to realize the description just given. The cell-wall is the dark, outside, circumference-line; the nucleus, the small circle in the centre; and the inter-cellular substance, the granular surface between the two. In one of the cells at *a*, you will see two nuclei. At *c* are some cells which show degeneration, and of course are not typical cells. At Fig 1 B, I show you the same cells, as seen in their natural position and relation to each other, in a section of the liver. They depart from the round shape shown at A, in consequence of the mutual pressure exerted upon each other; yet, here too, you will recognize each one as filling the description of a Nucleated Cell.

These cells are the active agents in secreting bile; hence, the liver performs its functions through the activity of these minute bodies.

I shall next show you in succession, several varieties of what are termed Epithelial Cells. They form the cuticle or scarf-skin, and also the surface of all mucous and serous membranes.

FIG. 2.

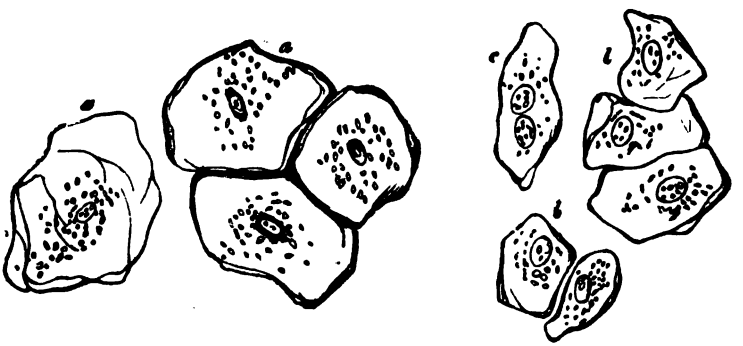

Fig. 2 represents what are termed Pavement-Epithelium. These are taken from the human mouth. *a a* shows them of large size; *b b* of smaller. At *c* is a cell containing two nuclei. They are also called Tessellated Epithelium, because when in their natural position, as at *a*, they are fitted to each other like a well laid tessellated pavement. These are flat-

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tened, scale-like cells when mature; but beneath them are minute, rounded nucleated cells, constantly developing to take their places, as these, having performed their function, become worn out and are thrown off. Fig. 5 will show this constant development of new cells. It is this variety which forms the scarf-skin, and also the outer surface of *some* of the mucous membranes.

FIG. 3.

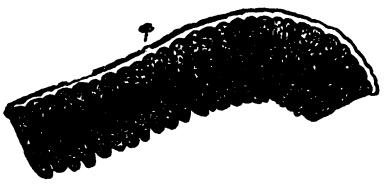

Fig. 3, represents what is called Columnar Epithelium. You see the cells as cylinder-shaped bodies, each containing a nucleus, and resting at one end on what is termed the basement-membrane, represented at *a*, and their other ends forming a free surface. These cover the mucous membrane of the whole alimentary canal, as well as some other mucous surfaces.

In Figs. 4, and 5, I show you, perhaps, the most interesting of all varieties of epithelial cells, viz: the Ciliated. These are nucleated cells, fringed with delicate, hair-like processes at their free extremity.

FIG. 4.

Fig. 4, represents simple Conoidal Ciliated Epithilial Cells. *a*, is the nucleated cell, and *b*, the ciliæ.

Fig. 5, represents a section through the entire thickness of the mucous membrane of the Human Trachea, showing the continuous process of developement of new cells, to take the place of those which have become effete. *a*,

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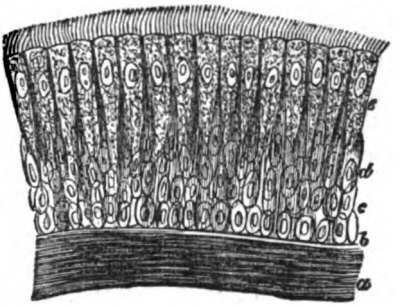
FIG. 5.



is the basement-membrane, which forms the foundation of all mucous tissue; on one side of which bloodvessels ramify, and which is permeated by capillaries from which the cells on the other side draw their nutriment; *b*, represents a layer of simple, round, nucleated cells,—the nuclei large in proportion to the size of the cell; *c*, shows you cells more fully developed; *d*, a layer still further advanced; and *e*, the perfect, mature, cilliated cell, ready for the full performance of its functions. As the mature cells become worn out, having lived their little lives and performed their functions, they are thrown off, and these younger ones are constantly developing to supply their places. This process is going forward in all surfaces covered by epithelium.

I spoke of these as being of peculiar interest. They are endowed with an inherent power to keep these ciliæ in constant motion, so that a surface covered with them presents, under the microscope, the wave-like appearance of a field of grass or grain under a gentle breeze. These waves are towards the upper orifice of the tube. Not only the Trachea, but the bronchial tubes are lined with this variety of epithelium. Any excess of mucus, as we have while suffering from a cold; or any foreign matter—as particles of dust—are caught in these fringe-like processes; and by this wave-like motion are carried forward within reach of the muscles for excretion. They retain their vitality, and exhibit their phenomena, for some moments after removal from the body, and even, sometimes, after the death of the body. These, as well as all other varieties of epithelial cells which cover mucous membranes, are also the factors in secreting mucus, by which these membranes are kept soft and moist.

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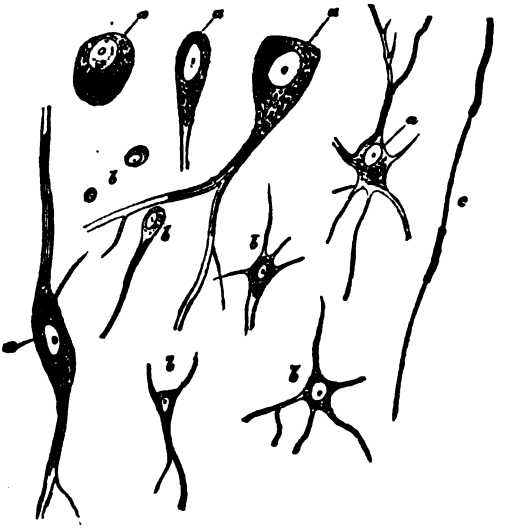
FIG. 6.



In Fig. 6, I show you a representation of Nerve-Cells taken from the human brain; *a*, *a*, *a*, are larger, and *b*, *b*, *b*, are smaller sized cells. As you see, they differ greatly in size and shape, and yet, with all their diversity, the description which I gave you of a nucleated cell, applies to them. These are the active agents in developing thought, emotion, and all the various phases of nerve-force.

FIG. 7.

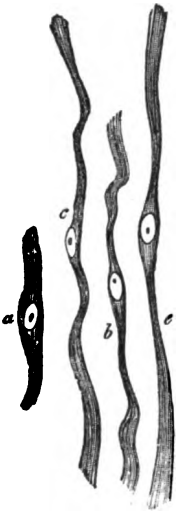


Fig. 7, represents the Formative Cells of Connective Tissue. This tissue enters largely into the formation of the body. It forms the basis of membranes, and is an important constituent of bloodvessels. It forms a covering or sheath for nerves, muscles, bones and vessels, and beneath the skin is a continuous layer of it, into the meshes of which fat globules are deposited. At *a*, is the simple cell; *b*, *c*, *c*, the cells elongating into fibrils, which, by their interlacing, form tissue.

I have thus shown you several varieties of cells, with a running commentary on their functions in the animal economy. They differ much in shape and size, and yet, however great their diversity, they all conform to the description of the nucleated cell.

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I trust that the exhibition of the plates has enabled you to verify—through the eye—the verbal description given, and to fix the ideal of a nucleated cell in your minds, so that in what I shall say hereafter, you will the more readily comprehend my meaning.

Time will not allow a more extended demonstration of the various different cells which form the tissues and organs of the body.—

In the animal economy, two modes of propagation or multiplication of cells are recognized, viz: by division, called fissiparous multiplication, and by the development of new cells *within* the parent cell, called endogenous multiplication.

In fissiparous multiplication, the nucleus gradually elongates, becomes constricted in its middle, and at last divides into two nuclei. The same change goes on in the other constituents of the cell. The cell-wall closes between the two nuclei, and we now have two perfect cells. The same change may take place quadrilaterally, the nucleus breaking up into four nuclei, and the other constituents of the cell closing around each, so that now we have four perfect cells. Each of these is capable of again dividing and propagating itself in the same way.

In the endogenous multiplication, the nucleus breaks up into several nuclei. Each of these develops itself into a perfect cell. They grow, fill the parent-cell, burst its cell-wall and each becomes an independent cell, which in turn may pass through the same process.—

I have heretofore given you only the more general mode of describing cells, as being best calculated to convey to your minds a correct idea of them.

Other descriptions are given by different observers. Prof. Huxley divides the cell into Endoplast (*endon*, within, and *plasso*, to form), which represents the nucleus; and Periplast (*peri*, around, and *plasso*, to form), which corresponds with the cell-wall and inter-cellular substance.

Prof. Lionel S. Beale makes use of a mode of description which also carries with it his views of the physiology of the

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cell. He considers the "nucleus" or "endoplast" as *formative* or *germinal* matter, and the "cell-wall" and "intercellular substance" or "periplast", as *formed* matter.

The former (germinal matter) is the factor or agent in all cell-transformations. It alone is endowed with power to draw from the circulating fluid the pabulum which it needs, and elaborate it into the formed matter which constitutes the other constituents of the cell.

In it alone resides the inherent power to divide, and multiply, by throwing off particles of itself, thus making new centres of germinal matter (nuclei) which develope themselves into perfect cells.

He thinks the most frequent mode of multiplication of cells is by a process of budding, as seen in Fig. 8 in the accompanying plate. These projections of germinal matter are separated from the mass, and become the nuclei or germinal part of new cells.

As the germinal matter absorbs an ammoniacal solution of carmine and the formed matter does not, it becomes easy to delineate his views by diagrams. A careful study of the accompanying plate will help you to understand them, and give you a clearer idea of the cell as an active element of our organism. The red portions are the germinal matter (nucleus, endoplast) and the gray portions are the formed matter (cell-wall and intercellular substance, periplast.) In Figs. 13, 14 and 15 you will see the formed matter differentiated into muscular fibre, elastic tissue and nerve-fibre. All these cells are greatly magnified, as you will see by the multiplication [x] sign and figures; x 700 indicating that the cell was magnified 700 times.*—

In embryonic life everything starts from the single cell. With certain restrictions, man may almost be said to pass

* Members of the profession who desire to know more of the cell-theories and their history, and who yet have not time to study the complete works of authors, will find a concise synopsis of the various views entertained on the subject in a little volume by James Tyson, M. D., "The Cell Doctrine," published by Lindsay & Blackiston, Philadelphia.

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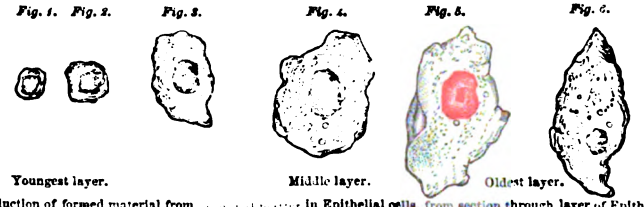
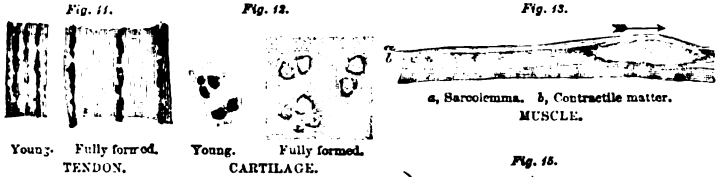


Production of formed material from [illegible] in Epithelial cells, from section through layer of Epithelium covering papillæ of the tongue. ×700.

FORMATION OF PUS.

To illustrate the change in [illegible] of an Epithelial cell, resulting from increased nutrition, showing the manner in which the [illegible] of a normal cell, if supplied freely with pabulum, may give rise to pus.

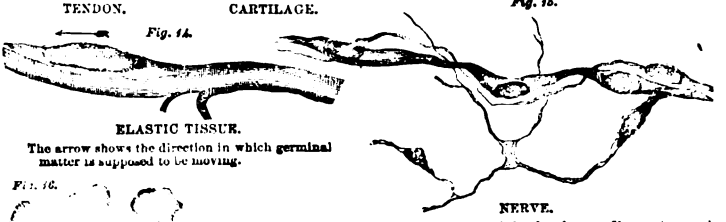


a, Sarcolemma. b, Contractile matter.

MUSCLE.

TENDON.

CARTILAGE.



ELASTIC TISSUE.

The arrow shows the direction in which germinal matter is supposed to be moving.

NERVE.

Development of young, dark-bordered nerve fibres, at an early period, showing [illegible] and formed material of elementary parts. ×1800.

AMŒBA.

Pure [illegible] matter. ×5000.

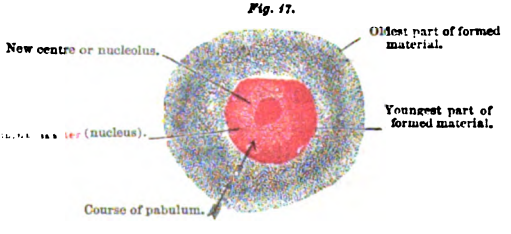


PLATE ILLUSTRATING DR. BEALE'S VIEWS.

H. Schmid, Sc.

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through the whole range of organic animal life, from the lowest type upward, viz: the simple cell, the mass of cells, the aggregation or development of cells into organ after organ, heart and bloodvessels, brain and nerves, muscle and bones, joints and sinews, until the whole complex being is fitted for independent life. The various modes of cell-multiplication or cell-generation are in active force. After birth the same processes are carried forward during the whole period of growth and development, until the perfect being is announced in adult life.

This period reached, the being developed into the type which God made when he pronounced His work good, the office of these cells is no longer to multiply themselves, for purposes of growth of the body, except under extraordinary circumstances, but simply to supply the places of those which have become effete, and by so doing maintain the whole economy in perfect health.

Remember that I said, in speaking of vegetable life, that each cell had its own individuality, and could only draw from the circulating medium—the sap—and elaborate for use, just such elements as were necessary for its growth and development into the special constituent to which it belonged, whether leaf, woody fibre, bark, flower or seed.

The same principle holds good in animal life also.

Here we find the same law under higher conditions, and with more complex machinery for its accomplishment. Instead of simple tubes, and the laws of capillary attraction and chemical affinities which regulate the circulation of sap in plants, we have a beautiful arrangement of vessels reaching every molecule of matter in the organism, and a central organ to force the current of nutrient material through them.

By this means each cell is fed by the blood, which contains the elements of the entire body. But from this mass of elements each cell can only appropriate its own part. Muscle-cell absorbs into itself and elaborates only material for formation and functional activity of muscle. Brain and nerve-cells can only appropriate to themselves material for for-

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mation and function of brain and nerve; and so of bone-cell, gland-cell, cartilage-cell, etc.

Each cell is a little entity. It lives its individual life and performs its individual functions. The sum of all these lives constitute the life of the being. They are microcosms which make up the macrocosm.

It is true that they are under the general supervision and, to some degree, control of a certain set of nerves, which we term the nerves of organic life; but this does not interfere with the individuality of each, and only combines their action into harmony, and directs it to certain results.

In these processes of cell-life lie the origin and maintainance of all force as developed within the human economy. Upon their integrity depends the well being and usefulness of the individual.

What are the conditions upon which these processes depend?

1st. An adequate supply of pure blood, from which each cell may draw the material for its own life; whether of muscle, bone, brain or nerve.

2d. A normal rate of current of the same.

3d. An abundant supply of oxygen, which is a main factor in the chemical changes involved in the elaboration of blood by the cells into its ultimate organic form, as also in carrying off the effete matter which results from this activity.

4th. Seasons of rest, in due proportion to time of activity.

For a supply of the first, good food, in sufficient variety, and properly cooked, and good digestion are necessary.

Volumnes have been written upon this topic, and much might still be said, but I can only mention it here as pointing to the necessity of intelligence and thought in the culinary department of the household.

For the regulation of the second, we are provided with a certain system of nerves, which, unconsiously to ourselves, rule and regulate it according to the wants of the various parts of our system.

For the third and very important condition, the supply of

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oxygen, the lungs are the chief organs engaged; and wonderfully are they adapted to their function. The lungs of man alone prove the divine in our creation, for man could never have conceived the beautiful arrangement by which, in a given space, so large a surface should be provided by a system of vesicles for the supply of a necessary chemical element. These vesicles, which are the ultimate expansion of the bronchial tubes, are covered with a beautiful net work of capillary vessels. At each inspiration the air is carried into every one of them, where, by a simple chemical law, the oxygen is absorbed by the blood, which is carried to every part of the system laden with it, while by the same chemical laws much of the result of activity and waste is eliminated at each expiration. At every pulsation of the heart, and every inspiration of the lungs, the process goes on as a necessary result.

For the fourth condition, viz: "Seasons of rest in due proportion to time of activitiy," I shall have more to say.

If I have made myself understood thus far, you will remember that all functions are performed through the agency of the cells which form the basis of organization in every organ. The liver secretes bile by the activity of the liver-cells; the muscles contract by the functional activity of the cells which form muscle; nervous force is generated through the agency of nerve-cells. The mind, acting through the brain, is indebted to its cells for every thought and emotion. Our bodies are an aggregation of myriads of entities; each of which, under favorable circumstances, is working out its mission.

But this work is accomplished, like all work, through the waste or wearing out of material. Each cell draws from the blood, and elaborates for itself, the elements for its own nutrition, and the performance of its function; but each exercise of functional activity draws upon its resources. Every contraction of muscular fibre is accompanied by, and performed through, a waste or wearing out of its material. Every effort

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of thought draws upon the resources of the cell-life of the brain, and is accomplished through waste of tissue.

The oxygen, which is carried by the arteries to every molecule of the physical economy, is a main chemical factor in the elaboration of elements by the cells for their nutrition and functions, and combines with the effete matter, thus fitting it to be excreted in the form of carbonic acid through the lungs, or in various other forms, through the other secreting and excreting organs.

Hence, all action—mental, emotional or physical—is an expenditure of the force generated by cell-life, and is accompanied by a corresponding tendency to exhaustion.

The orator, who charms us with his eloquence, and upon whose sentences we hang with breathless interest,—the philosopher, whose range of thought startles us with its daring,—the poet, whose sweet imaginings and phophetic insight lift us above the sordid level,—the preacher, who discourses to us of life's dearest interests and aims, and of the rest that remains afterwards,—the physician, who amidst ceaseless anxieties and cares ministers to you in sickness,—the business man,—the artisan and laborer,—all workers, of every grade, whether engaged in labors which tax the brain or those which tax the body, accomplish their mission through the expenditure of the forces generated by cell-life; and this expenditure of force, with its accompanying waste or wearing out of material, necessitates renewal, or, that not accomplished, exhaustion.

In the ordinary working of the economy, waste exceeds renewal during the labors of the day,—hence, the feeling of weariness which makes rest welcome.

Then comes the night, and with it,—

"Tired nature's sweet restorer, balmy sleep,"—

in which waste is at its minimum, and repair or renewal at its maximum, and restores the equilibrium.

Kept within these bounds, the draught upon nature's processes is healthful.

Carried further, under the spur of ambition, sordid greed,

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mistaken sense of duty, or stern necessity,—the hours of labor in excess, and the period of rest inadequate,—cell-life wearing out faster than renewal can supply the waste,—and a process is started, which, persisted in, opens the way for countless disorders to attack the citadel of life, which were hedged out under a wiser course of action.

For every day of active life, which is not followed by its normal period of rest, so that the morning finds us fresh and vigorous, we have made overdraughts on nature, for which large interest must be paid until the debt is liquidated.

But let the same process go on for a continuous period, the debt constantly accumulating. Nature—which is a short term for the sum of our vital processes which constitute organic life—becomes enfeebled and less able to supply the demand.

See the results, or rather, I may say, *feel them*,—for I doubt not many of you have had some experience in these premises. An indisposition to labor ensues. Fitful seasons of activity, are followed quickly by listlessness and exhaustion. An irritable nervous system puts you at war with the world; little things irritate you; molehills are mountains; and the "harp of a thousand strings" is out of tune, from key-note throughout the diapason.

Many a humble christian has groped in darkness, feeling that God had hidden his face from him, when, by the transgression of simple physiological laws, he had placed a cloud between himself and the apprehension of spiritual truth.

Many a man of business fancies all his affairs working badly, when the trouble lies in his own exhausted cell-life.

Many a mother goes through life brooding over evils feared, when rest and recreation, by enabling nature to restore her waste places, would make the world to bloom with hope.—

For the normal working of the economy, a certain rate of circulation carriers a given quantity of blood and oxygen to

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every part of the system, for the maintainance of the organic functions, and the supply of all the reasonable demands of animal life.

Under *extraordinary* action what ensues?

Watch the process in yourselves by a simple experiment. Put the muscles of the arm in violent exercise for a few moments. In any one of us, whose muscles are not trained to continuous activity, the limb becomes so weary that we are obliged to give it rest.

We have exhausted the forces generated by its cell-life. Called upon suddenly for increased activity, these little molecules are not able to draw from the circulating current, and elaborate and appropriate material for their use as fast as the waste goes on.

This has been telegraphed to the nerves which control the circulation, and a larger supply of nutrient material is sent to them.

The heart and arteries give a fuller throb, carrying the life-giving element, and the veins are turgid with the products of waste, being carried to the proper organs for excretion. After a little, the feeling of weariness has passed away. Under the stimulated action, the exhausted cells have renewed themselves, and the quiet processes of ordinary life have been re-established.

All *extraordinary* action, then, is accomplished through the more rapid processes of functional activity, with waste and renewal, of cell life, carried on through an increased supply of blood and oxygen to the parts.

The same process is carried on in the brain under exalted mental action,

If continuous, the excessive waste, or the debris of cell-activity, is shown by the increased elimination of phosphatic salts, which enter largely into its composition.

Watch the orator who has been suddenly called upon to speak by some unexpected turn in debate.

He begins his effort, haltingly perhaps; there is no eloquence, certainly, in his opening sentences. His brain, from a state

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of normal activity, in which the cell processes have been going on at an ordinary rate, has been suddenly called upon for increased force. His ideas do not flow freely. His brain labors, and is kept to its work by an effort of the will. By degrees it draws to itself a larger supply of blood and oxygen, the cell-processes become more active. His eye begins to gleam and his action quickens. His ideas flow more quickly. As he proceeds the blood is bounding in his arteries. His brain is on fire, and no longer labors. Force, developed in thought, is generated rapidly. He is master of his theme. Imagination, memory, reason, all come forward unbidden, and he stands the mouthpiece of the busy brain, holding us entranced.

He has finished. See the look of weariness and exhaustion which soon comes over him. Waste has exceeded renewal, though both processes have been going on rapidly; and now he craves rest, until nature can restore the equilibrium.

Emotion, as well as thought and action, is exhausting. The same processes which develop the one, are the foundation for the other.—

The PASSIONS, which, under proper control, are necessary—and minister to the happiness of the human race, if allowed excessive sway, are a canker, eating out the life.

Why have I, at the risk of wearying you, dwelt so long on these physiological principles? It is that, understanding something of natures mode of working; knowing that every function performed, and every action consummated, is through these cell-processes; and that these little lives must be allowed food and oxygen, activity and rest, and be kept in their integrity; UNDERSTANDING THESE THINGS, you will more readily listen to my warnings, and wisely endeavor, for yourselves and your offspring, to keep your physical powers in proper condition.

It is because the spirit of the age, and particularly in our own country, is tending towards the evil of excessive waste, without giving time for renewal.

Steamboats, railroads and telegraphs have so quickened the

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pulses of daily life, and enlarged the scope of ambition, that to keep pace with our fellows, each is pushed to his utmost.

Calculations in business life, which in former times were the result of carefully matured reasons, must now be made almost by instinct or inspiration. The general diffusion of knowledge, in all its range, makes competition active.

We have brought to our homes the latest scintillations of philosophy and of science, and one is behind the times, if, amidst the business of life, he does not find time to catch the newest range, and every varying phase of thought, which the thinkers of the age give us.

In mechanic arts no mode of applying force, however ingenious, quite satisfies their devotees.

The old Syracusian cried "*Eureka*" when he had solved the problem in physics. Thousands have cried "*Eureka*" since, and still the ultimate good is not attained, but lures the seeker on and on, with the coy dalliance of a coquette.

I said that I should not decry the present, and sigh for the good old times. Nor shall I.

I would not see the world go back to the staid and plodding ways of the fathers. I glory in the fact that men are active, and grasping constantly for the best.

> "For I doubt not through the ages one increasing purpose runs,
> And the thoughts of men are widened by the process of the suns."

We are but carrying out our destiny and tending towards the culmination of all thought and action in the Divine.

> "Not in vain the distant beacons. Forward, forward let us range.
> Let the great world spin forever down the ringing grooves of change."

But, that we may keep our places in the active throng, and accomplish our part in developing this eternal purpose, I have lifted a voice of warning against certain evils which are iminent. Evils which are in great measure within your own control. When God made these bodies, so complex, and yet so simple in design, and breathed into our nostrils the breath of life, he so dignified our physical frames as to make them worthy of our thoughtful care.

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Are His laws, embodied within us, less His laws than the decalogue? Rest assured He will not hold him guiltless who sins against his body. Our individual good, and the well being and destiny of humanity, demand of us that we possess sound minds in healthy bodies. The two must go hand in hand, and man *can not* transgress these physiological laws, without incuring the penalty.

Less serious would be the aspect of these things, did the result stop with the transgressor.

But here, most emphatically, the iniquities of the fathers are visited upon the children unto the third and fourth generations. Your offspring—dearer to you than your own lives—feel in their organisms the result of your unwisdom. Many of the evils of life experienced by them result from it. Nay, many of the iniquities and even crimes which disfigure human nature, are the results of physical defects inherited from parents, who set at defiance God's laws as embodied in their physical organization.

Said a mother, whose patience with an erring son was an ever flowing fount, "I cannot give him up; at heart he is good. He cannot help it; his father is responsible for it." Said another, whose heart was broken over the loss of a daughter in the bloom of womanhood, and whose friends were condoling with her over the "sad dispensation of Providence," "Nay—call it not a dispensation of Providence, when it is my own sin visited upon her. I killed her in my own early life, by breaking down my powers in the overwork of a growing household." Her wisdom came too late; but perhaps the warning is not too late for some of you.

In older countries these things are starting profound inquiries. The large class of laborers have so far deteriorated in the scale of humanity, that the question forces itself upon the statesman and philanthropist,—why are these things so? Why are our lowest classes so nearly animal, and vicious animals at that? The answer comes home to them in thunder-tones. "You have so long over-worked and under-fed us that you now reap the inevitable results thereof."

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In my introductory remarks I spoke of the large augmentation of mental diseases. The statistics regarding this feature of the age are alarming, and may well give us anxious thought and research into their causes. Are you not prepared, by my remarks to-night, to trace them to their proper source?

You will remember that all healthful exhibition of thought is simply the development of force by the cell-life of the brain.

The enlarged scope given in every department of life's business, calls for greatly increased exercise of thought, and also of care and worry.

The thousand details of business, and the anxiety over the necessary uncertainties of business ventures,—"the confinement to the store—the counting-house—the ledger, and the desk,"—all drawing largely upon the cells of the brain for force, while adequate seasons of rest are not given them; and at the same time neglect of the ordinary laws of health, in physical exercise, food and digestion; must necessarily tend to these results.

It is nearly all wear and waste and but little of renewal.

Again, the neglect of physical training, and the refinements of the age, beget an excess of NERVOUS ELEMENT within us.

Our emotional natures hold too large a sway in the economy. Suddenly, in the history of our lives, comes a stunning blow of grief. Instead of a natural exhibition of this passion, it becomes the absorbing theme of brooding thought.

We shun the sight of God's beautiful creation, with the evidences of the happiness of His creatures; we immure ourselves from His sunlight and free air, we clog the machinery of our bodies at every point. Under the depressing passions, digestion ceases, or is performed imperfectly.

Remember that emotional excitement draws upon the cell-processes of the brain as much as any other mental act, and in this brooding grief the demands are constant, while the blood is impoverished through the paralyzed powers of digestion.

Is it strange, then, that the brain,—

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"Which some suppose the soul's frail dwelling place,
Should, by the idle comment which it makes,"

tell the tale of destruction?

Instead of harmony in its action, and capacity, and grasp in its scope, is it wonderful that it becomes,—

"Like sweet bells jangled, out of tune, and harsh"?

The large majority of those who people our insane asylums are there from exhaustion of cell-powers.

Either too great or too continuous draughts upon them for force, in developing emotion, thought or passion, with too little time for recuperation; or else, perhaps, only a normal draught upon them, but too little of real nutrient material in the blood—through indigestion.

Generally, all these go hand in hand.

WHEREIN LIES OUR REMEDY?

Much may be done for OURSELVES in this present generation.

Keeping in mind the inevetable results of too much or too constant draught upon the vital processes, give yourselves sufficient time for rest and recuperation.

Cultivate as you do the other Christian graces, that of cheerfulness, for under its influence all the powers of life are quickened. Consider not the time lost which is spent in happy release from toil.

Innocent sports and amusements are as much a necessity as air. God teaches this throughout the whole range of the animal economy by giving them instincts therefor.

In the culinary department of the household let thoughtful care govern its economy.

Remember, that to make pure blood, rich in all the elements for the nutrition of these little cells, of which I have said so much to-night, good food and good digestion are necessities. Above all things, in this department, throw the frying pan into the fire, *Plutonic fires if possible.*

Let the family re-union, at the table, be a season of cheerful, happy release from all the wear and tear of life. By all

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means possible, cultivate and develope your physical selves.

Much may be learned from sources to which we are not accustomed to look for good instruction, viz: the turf and the training schools, both ancient and modern, for gladiators.

Mark the extreme care with which the horse is trained for the highest development of speed and endurance. How nicely the seasons of rest are apportioned to those of activity! How gradually he is accustomed to the exercise of his highest power! A little to-day, a little more to-morrow; and after these seasons of speed, how carefully is he petted and groomed and talked to, and after a proper season of rest, fed and watered. All unmindful and ignorant of the laws which develop force, the trainer is still gradually increasing the capacity for activity of cell-processes, by properly adjusted seasons of exercise and rest, the proper allowance of food, and a cheerful temper.

In olden times, in the development of muscle and endurance in the gladiator and the candidate for honors in the Olympic-Sports; and in our time, in the training for pedestrian trials or the barbarism of the prize-ring, the same result is aimed at and the same means are employed.

Under such training the muscle-cells gain prodigious power. They enlarge, and increase in capacity for a prolonged draught upon their functional activity.

The gymnasium, properly cultivated, gives the same result.

Athletic sports, in all their variety, tend to the same end.

Properly indulged in, the pale and lax-fibred clerk or business man becomes ruddy and elastic, and the muscles, which at first wearied at trifles, become capable of great and prolonged exertion.

All exercises, which send the blood in fuller currents, and at the same time exhilarate the spirits, quicken the vital processes.

Often the best rest for an over-worked brain is some athletic sport which fulfills these requirements.—

If, in my remarks, I have seemed to address the men only, let me urge home upon you, ladies, the same principles.

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Particularly let me warn you against the sedentary habits so common to your sex. Debarred from the rougher sports, you have still the wide range of muscular action, which combines the necessary elements for physical culture, and is in perfect consonance with the delicacy and refined grace, with which you charm our ruder natures.

In the economy of life, you are queens in the home; can you rule your realm wisely, unless in your own persons, you can bring to the work sound minds in sound bodies? How can you bear with patience, much less with cheerful content and happiness, the thousand cares and claims upon your resources, unless your bodies are trained to a healthful development?

Perhaps many of you, of both sexes, are so deeply in debt to nature, that naught less than a prolonged season of rest and recreation will enably you to pay the debt. To such, my message is—*take the time.*

Suicide is not always a sudden act. He is as much a murderer who kills by slow poison, as the one who accomplishes his purpose by instantaneous action. Are we less guilty, if, in disobeying God's laws, we slowly sap the fountain of life within us, than we should be, if, by mad impulse, we impiously rush into his presence?

In the mutual relations of life, wisely ordered for our good, each has his responsibilities for the care of the others.

Work together to keep the home an asylum from all the wear and tear of busy life. After the active hours of labor are over, make it, in truth, a sanctuary of rest and happiness; where, under its genial influences,

> "The cares that infest the day;
> Shall fold their tents like arabs;
> And as silently steal away."

In this section of our country it is not necessary to raise a warning voice against one of the miserable affections of fashion, which consists in excluding God's free and beautiful sunlight, for the glare of the gaslight. Sunlight in the day time, and pure air in waking and sleeping, are necessities which

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you will too thoroughly appreciate, to allow yourselves to be drawn into dangerous paths by the dictates of that very moloch.

As a solemn duty which you owe to God, to humanity, and to your offspring—who are the innocent sufferers from your want of wisdom in these things—obey the simple laws of hygiene and sustain the dignity and integrity of these bodies.

Thus much for *ourselves*, who, perhaps, are suffering from inherited evils, and also from those engendered by our own acts. WE must do the best we can for ourselves, and redeem the evil, so far as may be. But I address some parents to-night.

Let me plead for your children.

Remember that in them the vital processes are not merely to keep the economy in *statu quo*.

Cell-life, besides developing functional activity and sustaining life, must also meet the requirements of growth and development, by the modes which I described in the earlier part of my address.

The periods of childhood and youth are formative. It is easy to shape the rising generation, either into likeliness to ourselves, or to give them such physical and mental development, that the demands which *strain our powers*, shall be met by them with the surplus force generated within them.

Encourage them in all atheletic sports. Let the air ring with their laughter, and the involuntary huzza of their companions attest their prowess.

Let not a false ambition for them lead you to crowd their mental development. Remember that renewal must keep pace with waste, and that in youth cell-processes are most active. It is not the amount of learning which can be crammed into their brains, that will make them shine in life; but the training and development of cell-activity and power, by the same laws of action and rest, which govern physical culture.

Choose not the school which shows the largest curriculum of studies. But choose rather the one, which, with a reasonable amount of study, gives also facilities for, and encouragement to the development of their physical powers.

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In our first class colleges the gymnasium is becoming a regular part of the curriculum, and is presided over by a physician who holds the title and dignity of "Professor of Physical Culture and Hygiene."

It is found that the health of the student is the better for it, and that the time taken from mental labor by it, is more than compensated by the increased vigor which they bring to their tasks.

I make the broad assertion, that no school in this age—either for males or females—is meeting the requirements of the times, without such aids to physical development, or their equivalent in facilities for athletic sports.

"The student, who, with a happy but delusive forgetfulness of self, barters for intellectual improvement his physical powers of action and enjoyment," is recreant to his duties to God and humanity. "*Mens Sana in Corpore Sano*," should be the watchword with all educators of youth.

Great events and important changes mark this era of the world.

The poet describes it well as "spinning down the ringing grooves of change."

He who studies carefully the signs of the times, looks forward to a future of this earth, which will dwarf all *our* conceptions of possibilities, and which will reduce the wildest dreams of the philosopher or physicist of our time, to the actual of our successors. Men of giant intellect now see

"The distant tops of thoughts,
Which men of common stature never see,
Greater than aught that largest words can hold
Or give idea of, to those who read.
They enter into natures holy place,
Her inner chamber, and behold her face
Unveiled; and hear unuterable things,
And incommunicable visions see;
Things now unutterable, and visions now
Of incommunicable glory bright;
Which lips of after ages will set forth
In words, or by their pencil picture forth;

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Who, entering farther in, behold again,
And hear unspeakable and marvelous things
Which other ages in their turn reveal
And leave to others, greater wonder still.

"Men, my brothers, men the workers, ever reaping something new;
That which they have done but earnest of the things that they shall do:

For I dipt into the future, far as human eye could see,
Saw the vision of the world, and all the wonders that would be;

Saw the heavens fill with commerce, argosies of magic sails,
Pilots of the purple twilight, dropping down with costly bales;

Heard the heavens fill with shouting, and there rained a ghastly dew
From the nations' airy navies grappling in the central blue;

Far along the world-wide whisper of the south-wind rushing warm,
With the standards of the peoples plunging through the thunder-storm;

Till the war-drum throbbed no longer, and the battle-flags were furled
In the parliament of man, the Federation of the world;

There the common sense of most shall hold a fretful realm in awe,
And the kindly earth shall slumber, lapt in universal law."

But ere old earth can thus slumber, what changes must occur! Changes in which we and our successors must be active factors. Shall we meet the requirements of the age? or shall we be "like dumb, driven cattle"?

He who made this earth will surely accomplish its destiny.

"He maketh the wrath of man to praise Him, the remainder of wrath he restrains."

If we clog the wheels in these changes, we shall simply be crushed beneath them. The world will still move forward in its cycles, and the eternal purpose will be accomplished.

But when God made us in his own image, and gave us this wonderful range of powers, He also demanded of us that we should be co-workers in furthering his designs.

He is leading us by new revelations of his laws and designs in the physical world.

He is leading us by a more complete revelation of Himself in the Gospel of His Son.

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Physical and spiritual regeneration are both placed within our grasp.

Shall we not seize upon both, and while we strive to make our souls mirror his image, make our bodies fit temples for their abode?

In doing this we are fitting ourselves for the grand work, which, amidst all the clash and clang of the world's machinery, that perhaps brings to us only confusion, is constantly going forward, controlled by omnipotent design.

When man by obedience to God's physical laws embodied within himself, all of which go hand in hand with his moral laws, shall so far correct the evils of the present, that instead of weakness and exhaustion of vital force, strength and power shall be the heritage of our sucessors; how will the earth spin forward to her ultimate destiny! And when, in future generations, this harp of thousand strings shall be in tune throughout its wide range of harmony; how will the world be filled with music, and every power of our souls and bodies be a song of praise!

Angels catching up the theme shall swell the loud acclaim, and carry to the heavenly hosts the grand announcement: MAN IS REDEEMED, BOTH BODY AND SOUL; and earth and heaven shall join in one accord to swell the loud anthem of praise to Him who made us so fearfully, and so wonderfully, and gave us part and mission in the development of his grand designs upon the earth.

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SACRED TO THE MEMORY

— OF —

ALBERT GALLATIN MABRY,

(Ex-President of the Medical Association of the State of Alabama),

— WHO WAS —

BORN AT JERUSALEM, SOUTHAMPTON COUNTY, VIRGINIA,

ON THE SEVENTH DAY OF SEPTEMBER, 1810,

— AND —

DIED IN SELMA, DALLAS COUNTY, ALABAMA,

ON THE TWENTY-THIRD DAY OF FEBRUARY, 1874.

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The next Annual Meeting of the MEDICAL ASSOCIATION OF THE STATE OF ALABAMA will be held at Montgomery, on the 2nd Tuesday in April, 1875, at 12 o'clock M.

Each County Society is entitled to send ONE DELEGATE for every four members.

The assessment upon the County Societies is ONE DOLLAR for each member, exclusive of COUNSELLORS and DELEGATES, the former of whom pay the one fee of ten dollars, and the latter five dollars.

The Secretaries of the respective Societies are requested to transmit to the Secretary their reports under Art. LXVIII, Sec. 14, Constitution, before the 1st Tuesday in April.

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